

5R10A
5R100A
RUN 4

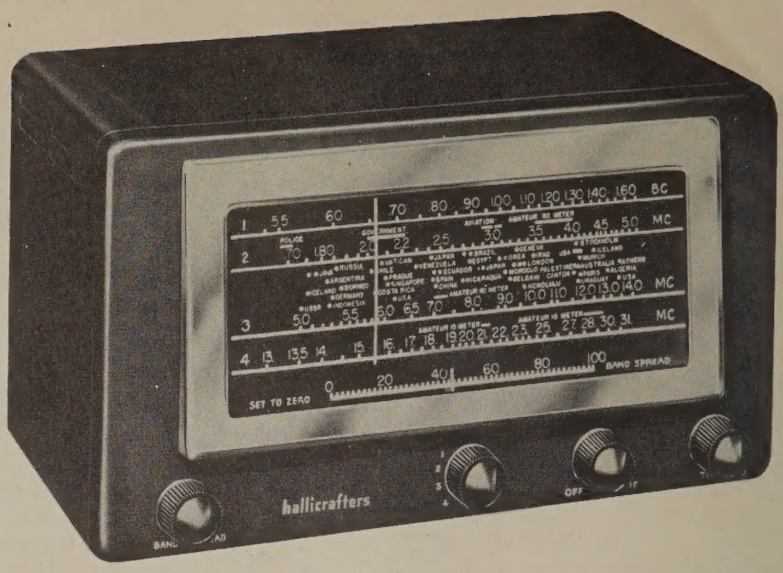
the hallicrafters co.

MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

Your new Hallicrafters radio offers you world-wide radio reception. It provides continuous coverage from 540 kilocycles to 31 megacycles to bring you standard broadcast programs, foreign and domestic shortwave broadcasts, amateurs, police, ships, aircraft and countless other exciting distant stations. It is a 5 tube superheterodyne radio and will operate on 105 to 125 volt AC or DC current. A 5-inch Alnico V permanent magnet speaker is built into the top of the cabinet and a socket is provided on the back of the set for plugging in a pair of headphones.

Fine performance of both standard and shortwave broadcasts can be obtained in most localities with the 15 foot antenna wire included with your receiver. Simply uncoil this wire, connect one end of it to terminal A1 on the back of the set and then run it about the room in any convenient manner. To complete the antenna installation, connect the jumper between terminal A2 and G.



94X1331-A

Hallicrafters Models 5R10A (Smokey Black) and 5R100A (Hammertone Grey)

Your set is provided with two tuning knobs for greater ease of tuning. Wide tuning is accomplished with the knob marked TUNING and fine tuning with the knob marked BAND SPREAD. The BAND SPREAD knob permits you to accurately tune in stations on crowded bands by spreading them out so that they may be more easily separated. In this way you are able to hear many more stations than you would on an ordinary radio with just one tuning knob.

The principal shortwave stations of the world are clearly marked on the dial for your convenience. Since shortwave conditions vary with the season of the year and even with the time of day, shortwave programs may not be heard with the same regularity as standard broadcasts. To aid you in determining the most favorable times for shortwave listening, a special table is provided on page 3.

To get the maximum enjoyment from your Hallicrafters radio, carefully follow the instructions contained in this book.

INSTALLATION INSTRUCTIONS

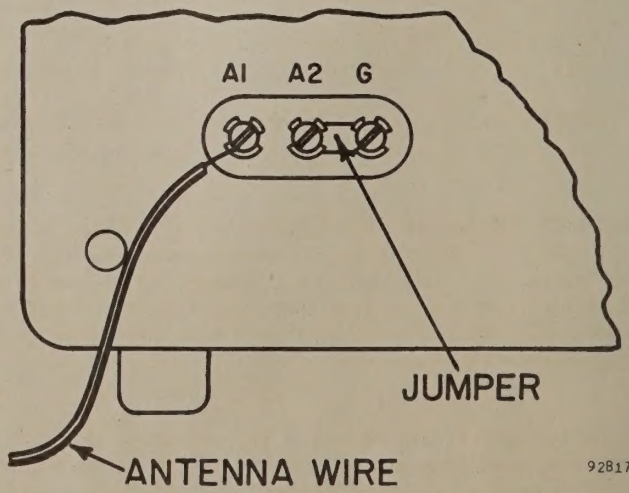
UNPACKING - Check all shipping labels and tags for instructions before removing or destroying them.

POWER SOURCE - The power plug should be inserted into a power outlet that will supply 105 to 125 volt DC or 60 cycle AC current. If in doubt about your power supply, call your power company before plugging in the receiver. The wrong power source may cause serious damage to the receiver.

LOCATION - Do not locate the receiver close to sources of heat such as radiators and heating vents. Allow for proper ventilation of the receiver by placing it at least two or three inches away from the wall.

ANTENNA - The terminals marked A1, A2 and G on the back of the set are for antenna and ground connections. Good results can be obtained in most localities with the 15 foot antenna wire included with your receiver. This wire should be uncoiled to provide maximum signal pickup. An outside antenna 50 to 100 feet long (ordinary copper wire) may be necessary if the receiver is operated in a difficult reception area or steel constructed building. Connect the antenna wire to terminal A1 on the back of the set and then connect the jumper between terminals A2 and G. In some locations, reception may be improved by connecting a lead from terminal G to a cold water pipe or outside ground rod.

For really top performance, there is no substitute for an outside antenna such as used by the commercial radio stations. Provision has been made on your receiver for the connection of this type of antenna, commonly called a doublet. When a doublet antenna is used, the jumper is removed and the antenna is connected to terminals A1 and A2. Consult your radio dealer for further information.



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Fig. 1. Rear View of Receiver Showing Antenna and Ground Terminals

OPERATING INSTRUCTIONS

TUNING DIAL - The top dial scale is the standard broadcast band and is calibrated in kilocycles, minus the last zero. To convert the dial reading to kilocycles, simply add one zero. The shortwave bands, marked 2, 3 and 4, are calibrated directly in megacycles.

BAND SELECTOR CONTROL - Set this control for the band you wish to tune.

VOLUME CONTROL - This control turns the receiver on and off and also controls volume. Turn the knob clockwise to turn the set on and to increase volume. Allow about one minute for the set to warm up.

IMPORTANT - When operating on DC, reverse the power plug if the radio does not operate after the one minute warm up. On DC, the set will operate ONLY with the plug in one position.

TUNING KNOB - Your receiver has been provided with two tuning knobs - The TUNING knob which operates the large pointer at the top of the dial and the BAND SPREAD knob which operates the small pointer at the bottom. The TUNING knob is for wide tuning and the BAND SPREAD knob for fine tuning. To tune the receiver, set the BAND SPREAD dial pointer to zero and then slowly turn the TUNING knob to the desired station. After the station has been accurately tuned in, adjust the VOLUME control for the desired volume.

IMPORTANT - The dial readings will correspond to the exact station frequency only if the BAND SPREAD dial pointer is set at zero.

BAND SPREAD KNOB - The BAND SPREAD knob permits you to accurately tune in stations on crowded bands by spreading them out so that they can be more easily separated. The BAND SPREAD knob can be used in two different ways. First, it may be left with the pointer at 5 while you partially tune in the desired station with the TUNING knob. Then, by "rocking" the BAND SPREAD knob back and forth (turn it a few degrees to the left and right through the desired station), you will be able to tune in the desired station with precision accuracy.

The second way to operate the BAND SPREAD knob is to use it to cover a group of stations. Set the BAND SPREAD knob so that the pointer reads 0 and then turn the TUNING knob to tune in the highest frequency station in the group. The other stations can be heard by slowly turning the BAND SPREAD knob from 0 to 100.

SPEAKER-PHONES SWITCH - Your receiver is equipped with a built-in speaker as well as a socket for connection to headphones. For speaker operation, set the SPEAKER-PHONES switch located on the back of the set at SPEAKER. For headphone operation, set the switch at PHONES. Any 500 to 5000 ohm headphones may be used with the receiver. To connect the headphones, press the headphone pins into the PHONES socket on the back of the set.

BEST SHORTWAVE RECEPTION TABLE

Band	Most Favorable Time	Most Favorable Distance
6-7 MC	Night - Winter	Day- 400 Miles Night - Over 1500 Miles
9-10 MC	Day - Late Afternoon and Night - Winter	Over 500 Miles
11-12 MC	Evenings or Late Summer Afternoons	Day - Under 1500 Miles Night - Over 1500 Miles
15-18 MC	Early Mornings and Summer Evenings	Over 1500 Miles

SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of your receiver, contact your dealer. Make no service shipments to the factory. The Hallicrafters Company maintains an extensive system of authorized factory service centers where any required service can be performed promptly and efficiently at a nominal charge. The sign shown at the right is displayed by all authorized service centers.



The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

92X1401-R

SERVICE INSTRUCTIONS

GENERAL SPECIFICATIONS

Tubes . . . . . 5 including 1 rectifier
Speaker . . . . . 5 inch PM
Voice Coil Impedance . . . . . 3.2 ohms
Headphone Output Impedance . . . 15 ohms
Antenna . . . Terminals for single wire or doublet antenna. (See Page 2.)
Intermediate Frequency . . . . . 455 KC
Frequency Coverage. . . 540 KC - 32 MC
Power Supply. . . . . 105-125 volts DC or 60 cycles AC
Power Consumption . . . . . 30 watts

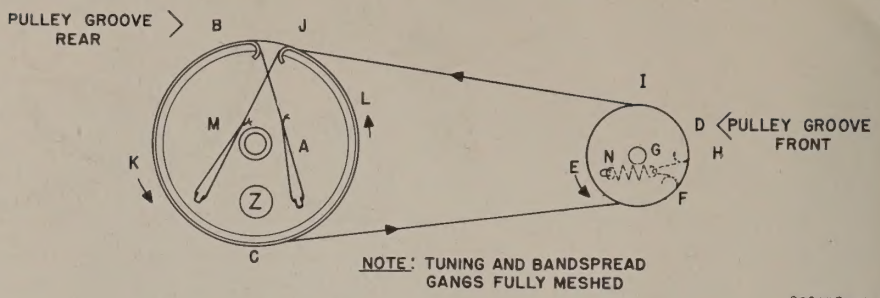


Fig. 2. Main Tuning Gang Drive Stringing Diagram

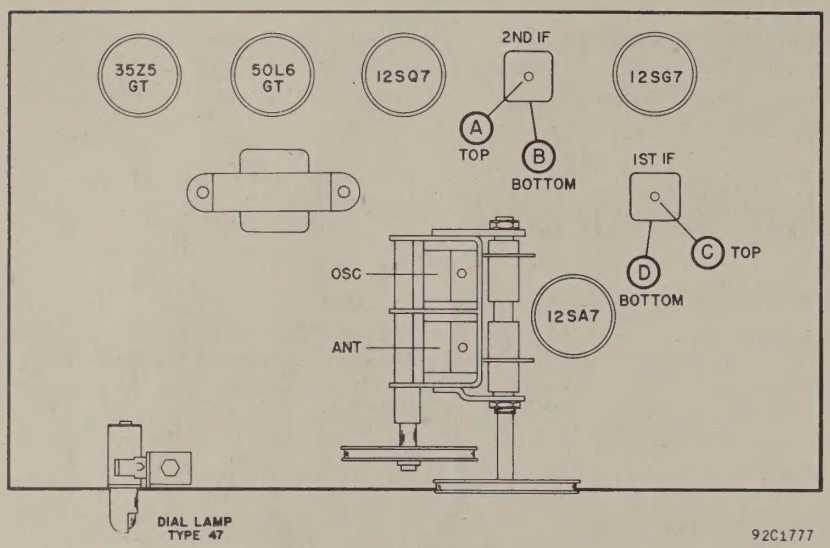


Fig. 3. Top View of Chassis Showing Location of Alignment Adjustments, Tubes and Dial Lamp

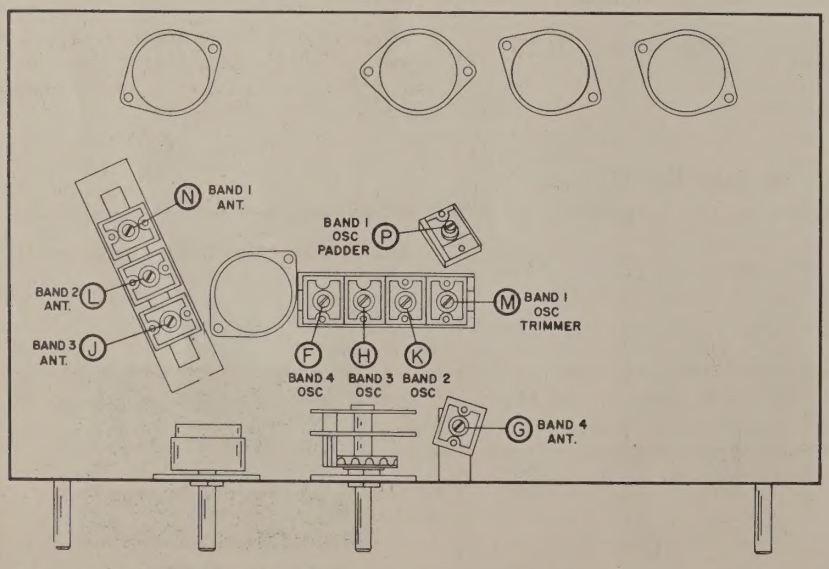


Fig. 4. Bottom View of Chassis Showing Location of Alignment Adjustments

DIAL CORD STRINGING

1. MAIN TUNING GANG DRIVE - Refer to Fig. 2. Tie one end of a 32 inch length of dial cord to the tie point at A on pulley (Z). Follow the stringing procedure A thru F. At G, place the cord thru one end of the tension spring, leaving the other end of the spring disconnected. Then proceed from H thru M. At M, take up the slack in the cord and tie it securely to the tie point. As the final step, stretch the spring and connect it to the tie point at N.

2. MAIN TUNING POINTER DRIVE - Refer to Fig. 5. Tie one end of a 50 inch length of dial cord to the tension spring at A on pulley (X). Follow the procedure A thru M. At M, stretch the spring and tie the cord securely. With the TUNING gang fully meshed, attach the large pointer to the cord and align it with the left hand index mark on band 1.

3. BAND SPREAD GANG & POINTER DRIVE - Refer to Fig. 5. Tie one end of a 41 inch length of dial cord to the tension spring at 1 on pulley (Y). Follow the procedure 1 thru 10. At 10, stretch the spring and tie the cord securely. With the BAND SPREAD gang fully open, attach the small pointer to the cord and align it with 0 on the band spread dial scale.

TUBE AND DIAL LAMP REPLACEMENT - Refer to Fig. 3 for the location of the tubes and dial lamp used in the receiver. To gain access to the tubes and lamp, remove the back cover from the cabinet. Before attempting to make any replacement, set the BAND SPREAD control fully clockwise and the TUNING control fully counter-clockwise to prevent damage to the tuning gang. To replace a tube, insert the center guide pin into the center hole of the tube socket, rotate the tube until the key drops into position and then push down until the tube is held firmly in the socket. To make a dial lamp replacement, unclip the dial lamp socket from the mounting clip. Make replacement only with a type 47 pilot lamp.

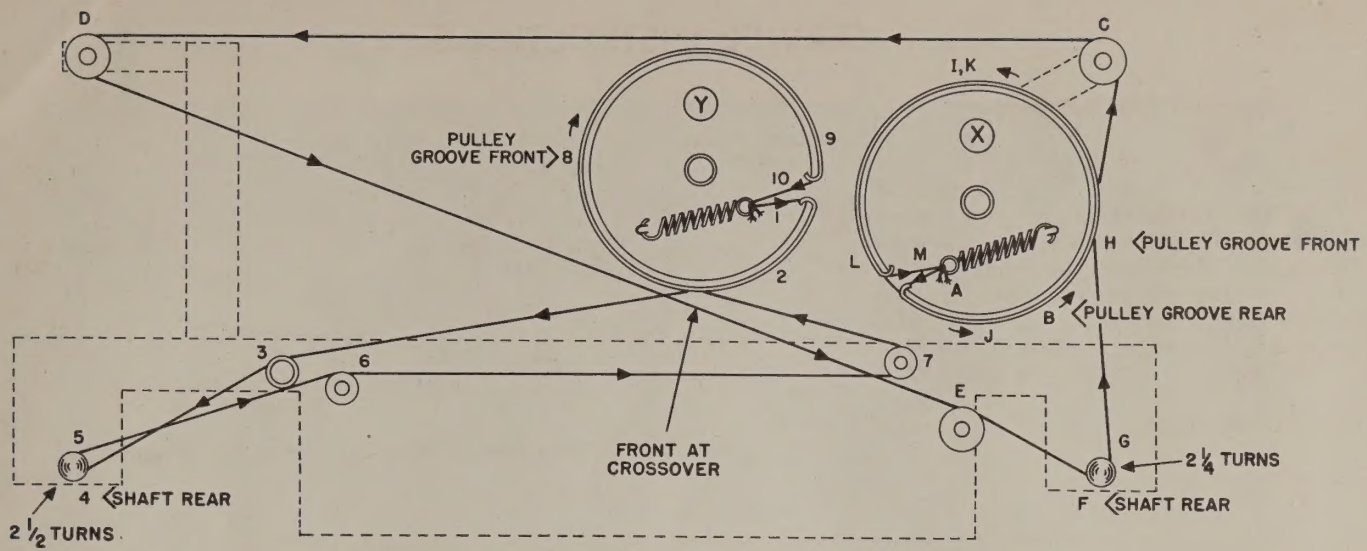


Fig. 5. Main Tuning Pointer Drive and Band Spread Gang and Pointer Drive Stringing Diagrams

ALIGNMENT INSTRUCTIONS

- Use an amplitude modulated generator covering 455 KC to 30 MC.
- Connect output meter across speaker voice coil.
- Use a non-metallic alignment tool.
- Set the SPEAKER/PHONES switch at SPEAKER, VOLUME control at maximum, and the BAND SPREAD control at 0.
- See Figs. 3 and 4 for location of alignment adjustments.

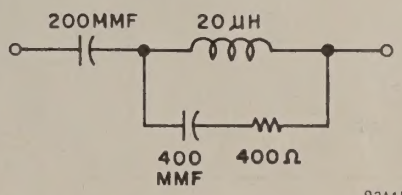
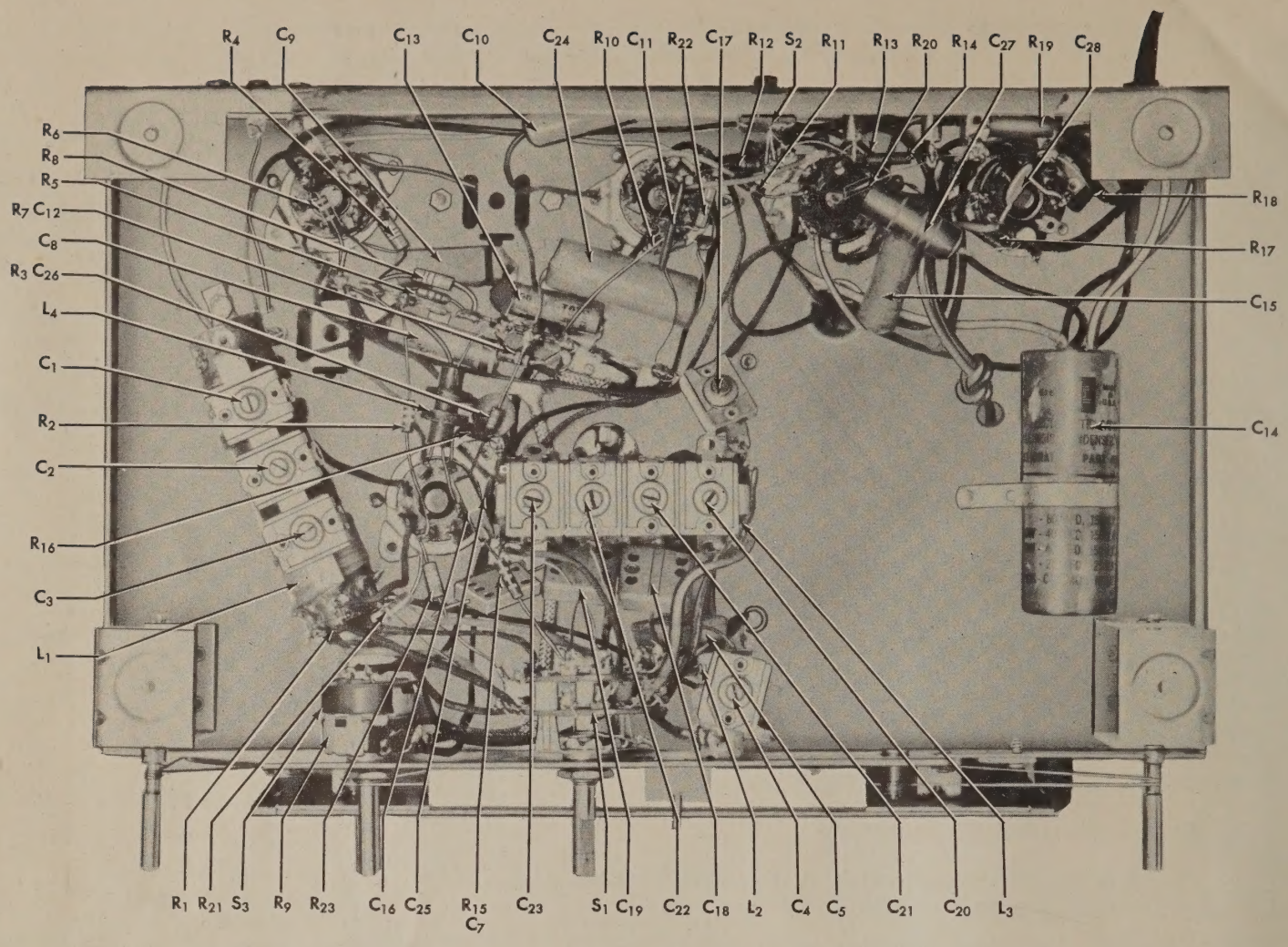


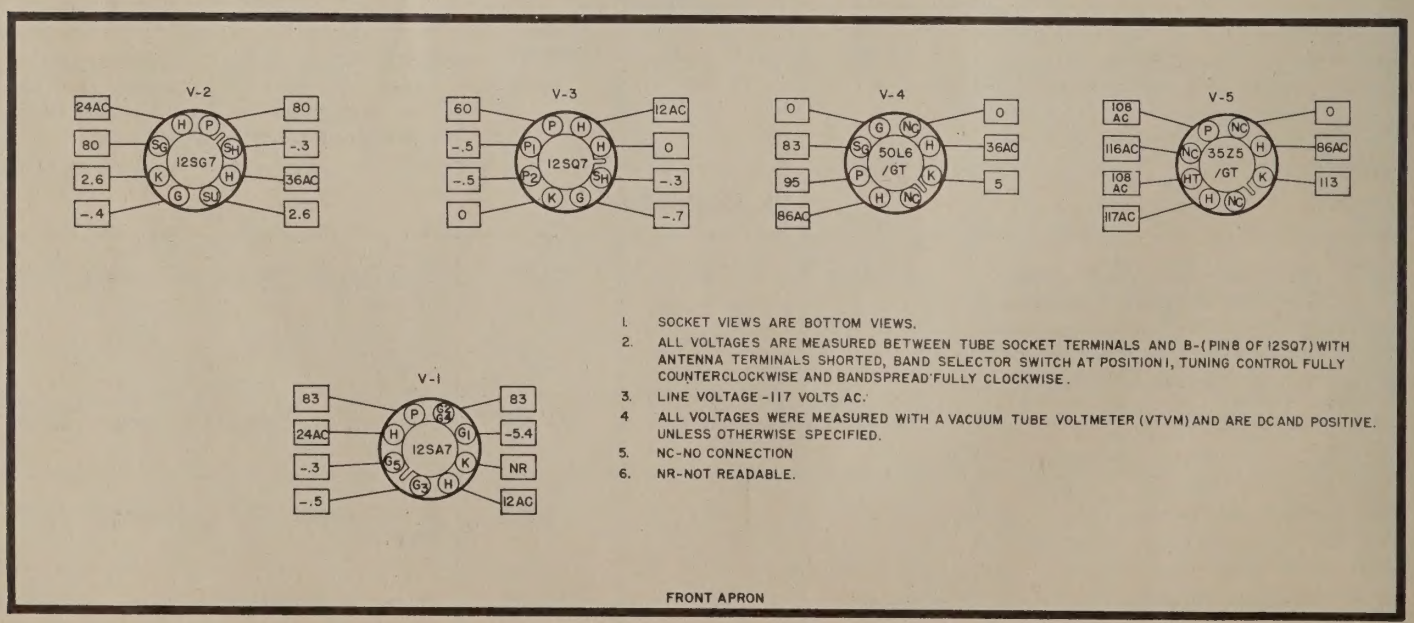
Fig. 6. RMA Dummy Antenna

Step	Signal Generator Connections	Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust
		IF ALIGNMENT			
1	High side thru a .01 mfd. capacitor to stator plates of front section of TUNING gang. Low side to chassis.	455 KC	1	1000 KC	A, B, C and D for maximum output. Keep reducing gen. output so that the reading on the output meter does not exceed 50 milliwatts.
		RF ALIGNMENT			
2	High side thru RMA dummy antenna (Fig. 6) to terminal A1 on back of chassis. Low side to chassis. Connect jumper between A2 and G.	30 MC	4	30 MC	F and G for maximum output as in Step 1.
3	Same as Step 2.	14 MC	3	14 MC	H and J for maximum output as in Step 1.
4	Same as Step 2.	5 MC	2	5 MC	K and L for maximum output as in Step 1.
5	Same as Step 2.	1500 KC	1	1500 KC	M and N for maximum output as in Step 1.
		600 KC	1	600 KC	P for maximum output as in Step 1.



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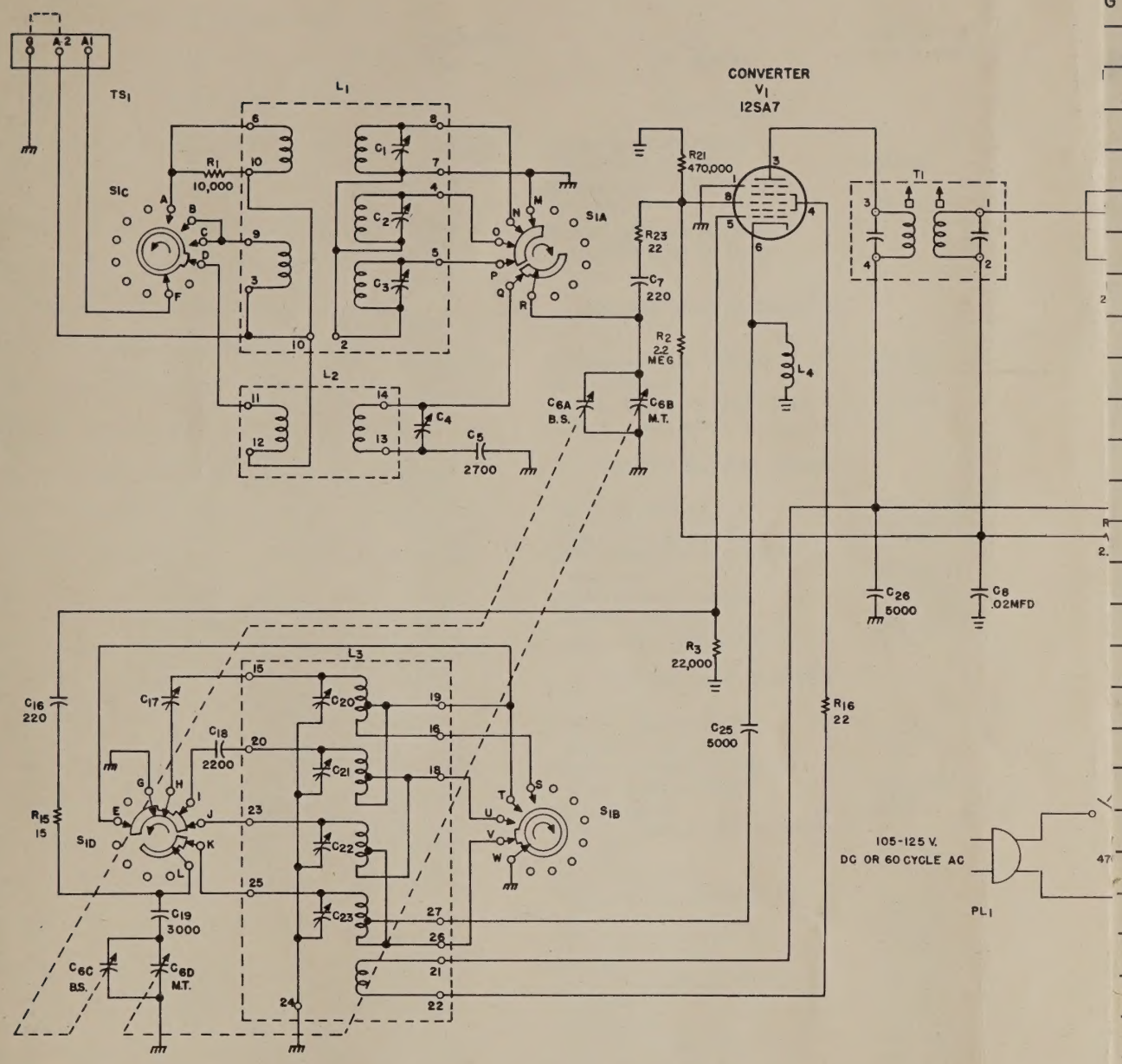
Fig. 7. Bottom View of Chassis Showing Component Location

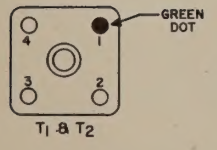


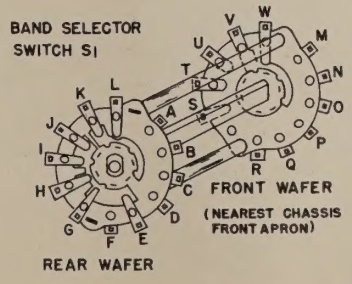
1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND B-(PIN 8 OF 12SQ7) WITH ANTENNA TERMINALS SHORTED, BAND SELECTOR SWITCH AT POSITION 1, TUNING CONTROL FULLY COUNTERCLOCKWISE AND BANDSPREAD FULLY CLOCKWISE.
3. LINE VOLTAGE - 117 VOLTS AC.
4. ALL VOLTAGES WERE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM) AND ARE DC AND POSITIVE. UNLESS OTHERWISE SPECIFIED.
5. NC-NO CONNECTION
6. NR-NOT READABLE.

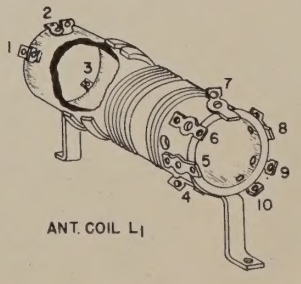
Fig. 8. Tube Socket Voltage Chart

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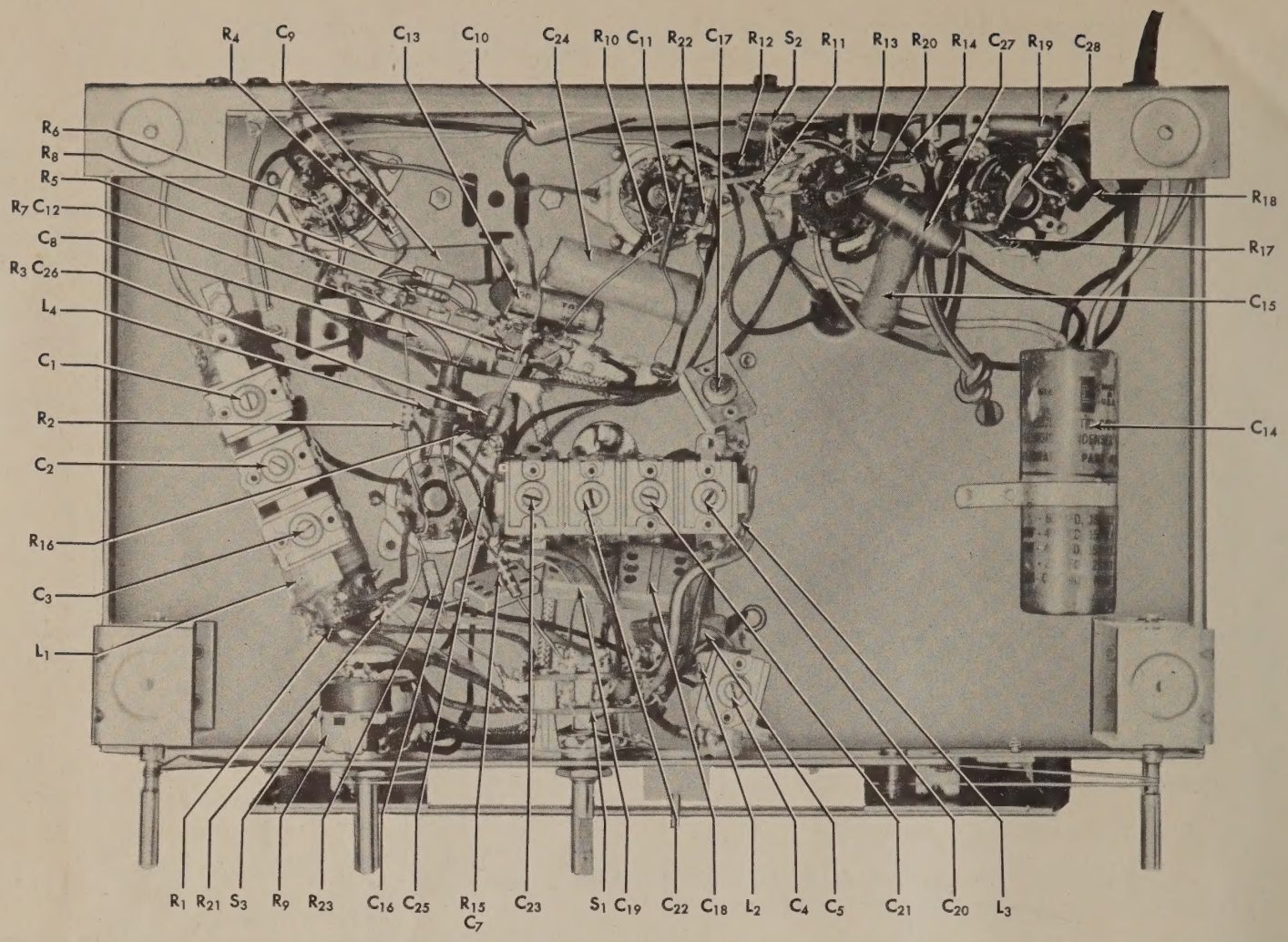








NOTE: VALUES & TOLERANCES SHOWN
IT IS RECOMMENDED THAT THE
TO THE NOMINAL VALUE OF THE



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Fig. 7. Bottom View of Chassis Showing Component Location

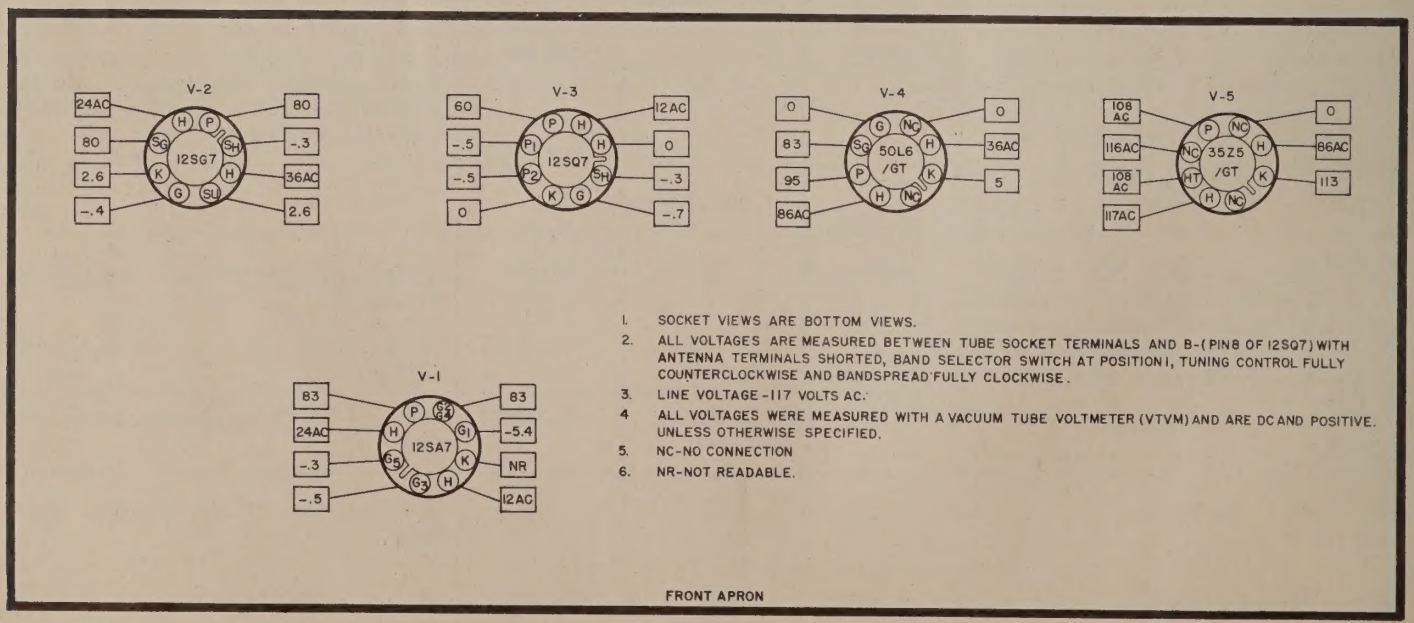
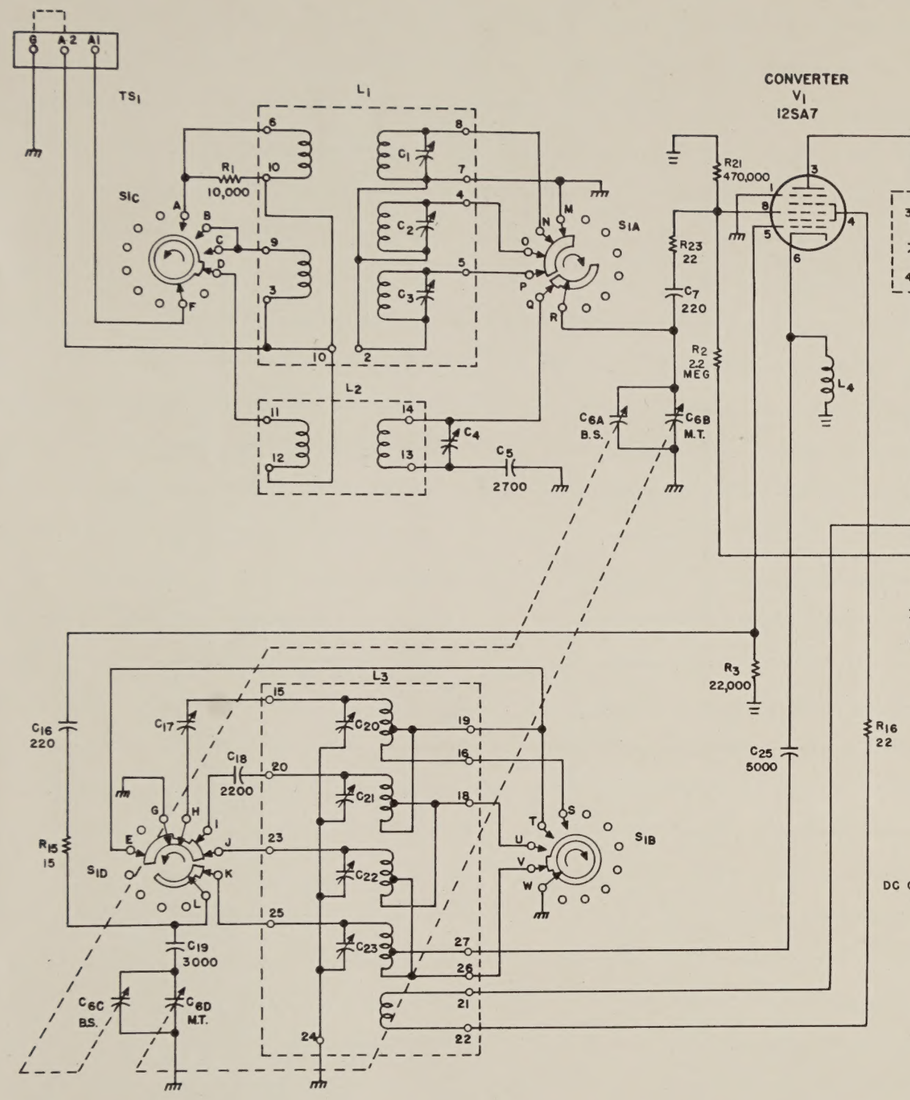


Fig. 8. Tube Socket Voltage Chart

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MODELS 5R10A and 5R100A

RUN 4



NOTES

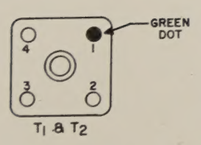
1. RESISTANCE VALUES ARE IN OHMS.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH (S_1) SHOWN IN BAND 4 POSITION.

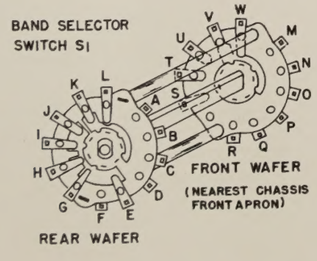
⏚ ELECTRICAL GROUND BUS (B-)

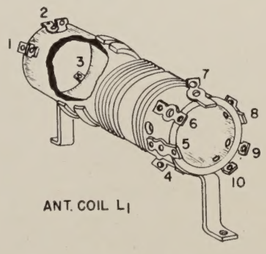
⏚ CHASSIS GROUND

LAST CAPACITOR SYMBOL C-28

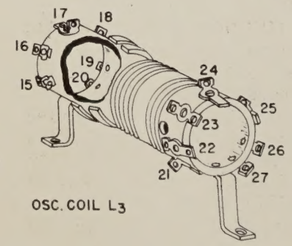
LAST RESISTOR SYMBOL R-23



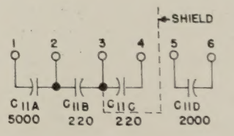












NOTE: VALUES & TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUES OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

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Fig. 9. Schematic Diagram

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3	Trimmer, adjustable (part of antenna coil L-1)	- - - - - -
C-4	Trimmer, adjustable; 20-120 mmf.	44A424
C-5	2700 mmf. 5%, 500 V.; mica	47X30B272J
C-6A,B, C,D	Tuning capacitor; 2 gang	48-269
C-7,12,16	220 mmf. 10%, 500 V.; mica	47X20B221K
C-8,15	.02 mfd. 600 V., tubular paper	46AY203J
C-9	.05 mfd. 200 V., tubular paper	46AU503J
C-10	.002 mfd. 600 V., tubular paper	46AZ202F
C-11A,B, C,D	Capacitor, composite: 5000, dual 220 and 2000 mmf. 500 V.; ceramic	46A151
C-13	.01 mfd. 600 V., tubular paper	46AZ103J
C-14A,B, C,D,	60-40-40 mfd. 150 V., 20 mfd. 25 V., electrolytic	45B091
C-17	Padder, adjustable; 525 mmf.	44A349
C-18	2200 mmf. 5%, 500 V.; mica	47X30B222J
C-19	3000 mmf. 5%, 500 V.; mica	47X30B302J
C-20,21, 22,23	Trimmer, adjustable (part of oscillator coil L-3)	- - - - - -
C-24	.05 mfd. 600 V.. tubular paper	46AY503J
C-25,26	5000 mmf. 450 V., ceramic disc	47A168
C-27	.02 mfd. 600 V., molded tubular paper	46BR203L6
C-28	.01 mfd. 450 V., ceramic disc	47A217
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103M
R-2,5	2.2 megohms 1/2 watt, carbon	23X20X225M
R-3	22,000 ohms 1/2 watt, carbon	23X20X223M
R-4	270 ohms 1/2 watt, carbon	23X20X271K
R-6	330 ohms 1/2 watt, carbon	23X20X331M
R-7	47,000 ohms 1/2 watt, carbon	23X20X473M
R-8,12, 21,22	470,000 ohms 1/2 watt, carbon	23X20X474M
R-9	2 megohms; VOLUME control	25B896
R-10	10 megohms 1/2 watt, carbon	23X20X106M
R-11	220,000 ohms 1/2 watt, carbon	23X20X224M
R-13	150 ohms 1/2 watt, carbon	23X20X151K
R-14,15, 17	15 ohms 1/2 watt, carbon	23X20X150M
R-16,18, 23	22 ohms 1/2 watt, carbon	23X20X220M
R-19	220 ohms 1 watt, carbon	23X30X221M
R-20	1000 ohms 1/2 watt, carbon	23X20X102M
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; bands 1, 2 and 3	51C821
L-2	Coil, antenna; band 4	51B1015
L-3	Coil, oscillator; all bands	51C822
L-4	Choke, RF	53A107
T-1	Transformer, 1st IF	50C531
T-2	Transformer, 2nd IF	50C532
T-3	Transformer, audio output	55A127

SHORTWAVE STATION LOG

STATION	CITY	TIME	BAND	TUNING DIAL SETTING	BAND SPREAD DIAL SETTING

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3	Trimmer, adjustable (part of antenna coil L-1)	- - - - - -
C-4	Trimmer, adjustable; 20-120 mmf.	44A424
C-5	2700 mmf. 5%, 500 V.; mica	47X30B272J
C-6A,B, C,D	Tuning capacitor; 2 gang	48-269
C-7,12,16	220 mmf. 10%, 500 V.; mica	47X20B221K
C-8,15	.02 mfd. 600 V., tubular paper	46AY203J
C-9	.05 mfd. 200 V., tubular paper	46AU503J
C-10	.002 mfd. 600 V., tubular paper	46AZ202F
C-11A,B, C,D	Capacitor, composite: 5000, dual 220 and 2000 mmf. 500 V.; ceramic	46A151
C-13	.01 mfd. 600 V., tubular paper	46AZ103J
C-14A,B, C,D,	60-40-40 mfd. 150 V., 20 mfd. 25 V., electrolytic	45B091
C-17	Padder, adjustable; 525 mmf.	44A349
C-18	2200 mmf. 5%, 500 V.; mica	47X30B222J
C-19	3000 mmf. 5%, 500 V.; mica	47X30B302J
C-20,21, 22,23	Trimmer, adjustable (part of oscillator coil L-3)	- - - - - -
C-24	.05 mfd. 600 V., tubular paper	46AY503J
C-25,26	5000 mmf. 450 V., ceramic disc	47A168
C-27	.02 mfd. 600 V., molded tubular paper	46BR203L6
C-28	.01 mfd. 450 V., ceramic disc	47A217
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103M
R-2,5	2.2 megohms 1/2 watt, carbon	23X20X225M
R-3	22,000 ohms 1/2 watt, carbon	23X20X223M
R-4	270 ohms 1/2 watt, carbon	23X20X271K
R-6	330 ohms 1/2 watt, carbon	23X20X331M
R-7	47,000 ohms 1/2 watt, carbon	23X20X473M
R-8,12, 21,22	470,000 ohms 1/2 watt, carbon	23X20X474M
R-9	2 megohms; VOLUME control	25B896
R-10	10 megohms 1/2 watt, carbon	23X20X106M
R-11	220,000 ohms 1/2 watt, carbon	23X20X224M
R-13	150 ohms 1/2 watt, carbon	23X20X151K
R-14,15, 17	15 ohms 1/2 watt, carbon	23X20X150M
R-16,18, 23	22 ohms 1/2 watt, carbon	23X20X220M
R-19	220 ohms 1 watt, carbon	23X30X221M
R-20	1000 ohms 1/2 watt, carbon	23X20X102M
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; bands 1, 2 and 3	51C821
L-2	Coil, antenna; band 4	51B1015
L-3	Coil, oscillator; all bands	51C822
L-4	Choke, RF	53A107
T-1	Transformer, 1st IF	50C531
T-2	Transformer, 2nd IF	50C532
T-3	Transformer, audio output	55A127

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1A,B, C,D	Bandswitch assembly; BAND SELECTOR	60C393
S-2	Switch, spdt; SPEAKER/ PHONES	60A243
S-3	Switch, power; spst (part of VOLUME control R-9)	- - - - - -
	SOCKETS AND CONNECTORS	
TS-1	Terminal strip, antenna	88A671
TS-2	Jack, PHONES	88A071
	Socket, dial lamp; with leads	86A122
	Socket, octal; tube	6A250
	TUBES AND DIAL LAMPS	
V-1	12SA7: converter	90X12SA7
V-2	12SG7: IF amplifier	90X12SG7
V-3	12SQ7: detector and audio amplifier	90X12SQ7
V-4	50L6GT: audio output	90X50L6GT
V-5	35Z5GT: rectifier	90X35Z5GT
LM-1	Lamp, dial; Mazda #47	39A004
	MISCELLANEOUS PARTS	
	Cabinet, model 5R10A (smokey black)	66B702
	Cabinet, model 5R100A (hammertone grey)	66C915
	Cabinet back	32C500
	Channel, rubber (for escutcheon glass)	16A212
	Clip, dial mtg.	76A646
	Clip mtg. (for antenna coil L-2)	76A326
	Cover, cabinet bottom	32C501
	Dial background	32B488
	Dial cord (specify length)	38A026
	Dial scale	22B318
	Escutcheon	7C248
	Foot, mounting; rubber	16A244
	Glass, escutcheon	22B319
	Grommet, rubber	16A015
	Knob, BAND SELECTOR	15B323
	Knob, BANDSPREAD, OFF-VOLUME and TUNING	15B322
PL-1	Line cord and plug	87A078
	Line cord lock	76A397
	Pointer, dial; bandspread tuning	82A198
	Pointer, dial; main tuning	82A199
	Shield, dial lamp	8A1249
LS-1	Speaker, PM; 5 inch	85C030
	Spring, dial drive; 17/32"	75A012
	Spring, dial drive; 3/8"	75A173

SHORTWAVE STATION LOG

STATION	CITY	TIME	BAND	TUNING DIAL SETTING	BAND SPREAD DIAL SETTING

Warranty

"This product is warranted to be free from defective material or parts, and it is agreed to furnish a new part in exchange for any part of this unit which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to the authorized radio dealer or wholesaler from whom purchased, intact, for examination with all transportation charges prepaid, within ninety days from the date of sale to original purchaser and provided that such examination discloses that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our authorized facilities, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

94 X 561

the Hallicrafters co.

BOOK NO. 94X1196
453 - RUN 4

HALLICRAFTERS
MODEL 5R10A



HALLICRAFTERS
MODEL 5R10A

TRADE NAME	Hallicrafters Model 5R10A
MANUFACTURER	Hallicrafters C., Inc., 4401 W. 5th Ave., Chicago Ill.
TYPE SET	AC-DC Operated Multi-Band Superheterodyne Receiver
TUBES (five)	Types 12SA7 Conv., 12SK7 IF Amp., 12SQ7 Det.-AVC-AF Amp. 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE	(Band #1) 540-1650KC, (Band #2) 1, 65-5.1MC, (Band #3) 5-14.5 MC, (Band#4) 13-31 MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning gang fully closed and set pointer to the reference mark to the left of 55 on the BC scale.
To set band spread pointer, turn bandspread tuning gang fully open and set pointer to zero on the reference scale.
The RMA dummy antenna referred to in the alignment table consists of a 200 MMF capacitor in series with a 20 microhenry choke which is shunted by a 400MMF capacitor in series with a 400Ω carbon resistor.
Turn the bandspread dial to zero on the reference scale.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to stator on front section of tuning gang. Low side to chassis.	455KC (400Ω Mod).	1	1000KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .0001MFD to reduce hum modulation.
2.	RMA	High side thru dummy to antenna terminal A1(connect jumper between A2 and G) Low sideto chassis.	30MC	4	30MC	"	A5, A6	Adjust for maximum output. Rock tuning gang while adjusting A6.
3.	"	"	14MC	3	14MC	"	A7, A8	Adjust for max. output. Rock tuning gang while adjusting A7.
4.	"	"	5MC	2	5MC	"	A9, A10	Adjust for maximum output. Rock tuning gangwhile adjustingA9.
5.	"	"	1500KC	1	1500KC	"	A11, A12	Adjust for maximum output.
6.	"	"	600KC	1	600KC	"	A13	Repeat steps 5&6 until no further improvements can be made.

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PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTER PART No.	IRC PART No.	
R2	10KΩ	½	23X20X103M	BTS-10K	Antenna Coil Shunt.
R3	470KΩ	½	23X20X474M	BTS-470K	Converter Grid.
R4	2.2Meg	½	23X20X225M	BTS-2.2Meg	AVC Network
R5	2.2Meg	½	23X20X225M	BTS-2.2Meg	AVC Network
R6	22KΩ	½	23X20X223M	BTS-22K	Oscillator Grid
R7	15Ω	½	23X20X150M		Parasitic Suppressor-See note
R8	22Ω	½	23X20X220M		Parasitic Suppressor
R9	390Ω	½	23X20X391K	BTS-390	IF Cathode
R10	390Ω	½	23X20X391K	BTS-390	IF Amplifier Decoupling
R11	47KΩ	½	23X20X473M	BTS-47K	Diode Filter
R12	470KΩ	½	23X20X474M	BTS-470K	Diode Filter
R13	10Meg	½	23X20X106M	BTS-10Meg	AF Amplifier Grid
R14	220KΩ	½	23X20X224M	BTS-220K	AF Amplifier Plate
R15	470K	½	23X23X474M	BTS-470K	Output Grid
R16	150Ω	½	23X20X151K	BTS-150K	Output Cathode
R17	220Ω	1	25X20X221M	BTA-220	Filter
R18	1000Ω	½	23X20X102Ω	BTS-1000	Filter
R19	22Ω	½	23X20X220M		Surge Limiter
R20	15Ω	½	23X20X150Ω		Head Phone Shunt
R21	15Ω	½	23X20X150Ω		Series Dial Light

NOTE: Some models use 10Ω resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		Hallicrafters PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	1.7KΩ	3.2Ω	147Ω	.8Ω	55A127	A-3876	A2928	R0-2	

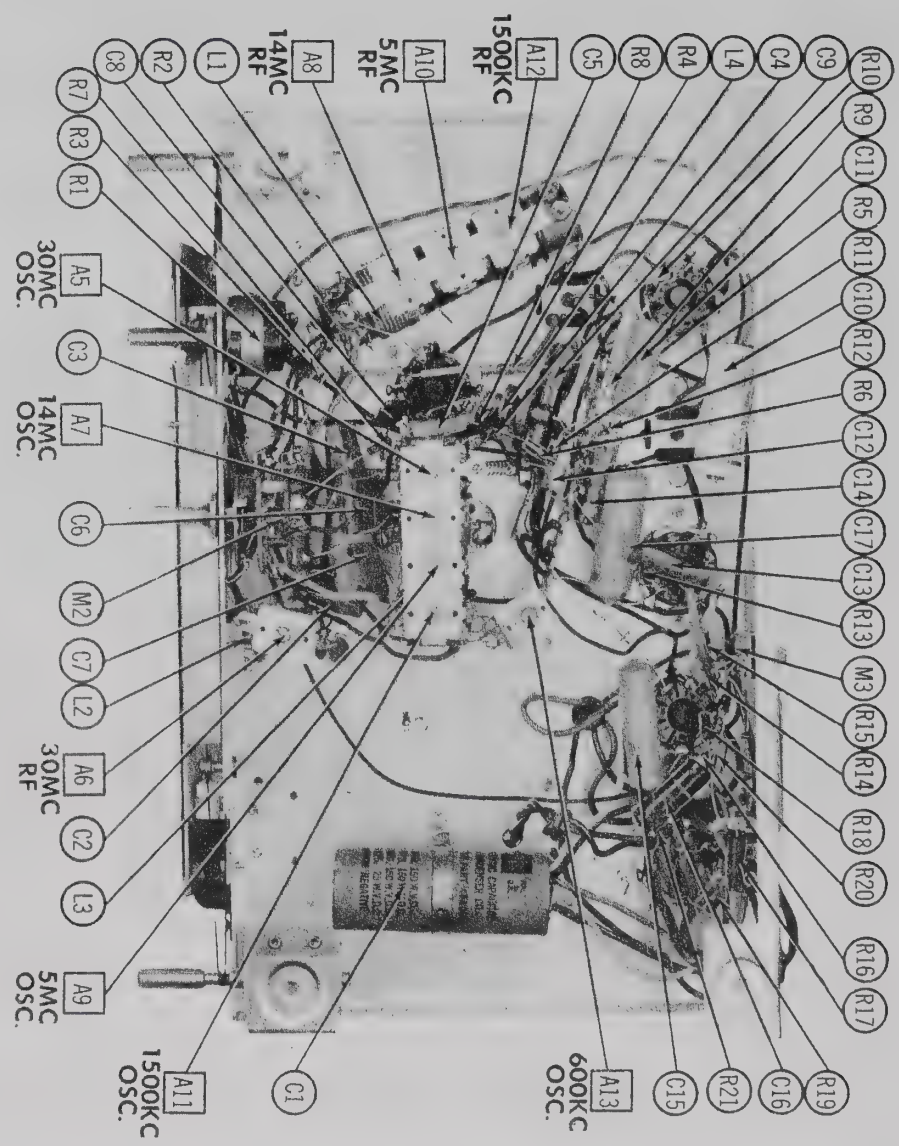
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD	V. C. IMP.	Hallicrafters PART No.	JENSEN PART No.	QUAM PART No.	
SP1	P.M.	3.2Ω	85C030	ST-105 Mod P5-X	5A1	
	CONE DIA.	V. C. DIA.				
SP2	4½ in.	9/16 in.				

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES	
		PRI.	SEC.	Hallicrafters PART No.	MERIT PART No.		
L1A	Ant. Coil	27Ω	0Ω	51C821		Band 1	
B	Ant. Coil	1Ω	0Ω			Band 2	
C	Ant. Coil		0Ω			Band 3	
L2	Ant. Coil	.2Ω	0Ω	51B1015		Band 4	
L3A	Osc. Coil	2.4Ω		51C822		Band 1	Tap at 2Ω
B	Osc. Coil	2Ω				Band 2	Tap at 2Ω
C	Osc. Coil	0Ω				Band 3	
D	Osc. Coil	0Ω	0Ω			Band 4	
L4	RF Choke	9.3Ω		53A107			
L5	Input IF	20Ω	20Ω	50B183			
L6	Output IF	20Ω	20Ω	50B184			

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	INSTALLATION NOTES
		HALLICRAFTER PART No.	STANDARD REPLACEMENT		
V1	Converter	90X12SA7	12SA7	8R	
V2	IF Amplifier	90X12SK7	12SK7	8N	
V3	Detector-AVC-AF Amplifier	90X12SQ7GT	12SQ7GT	8Q	
V4	Power Output	90X50L6GT	50L6GT	7AC	
V5	Rectifier	90X35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

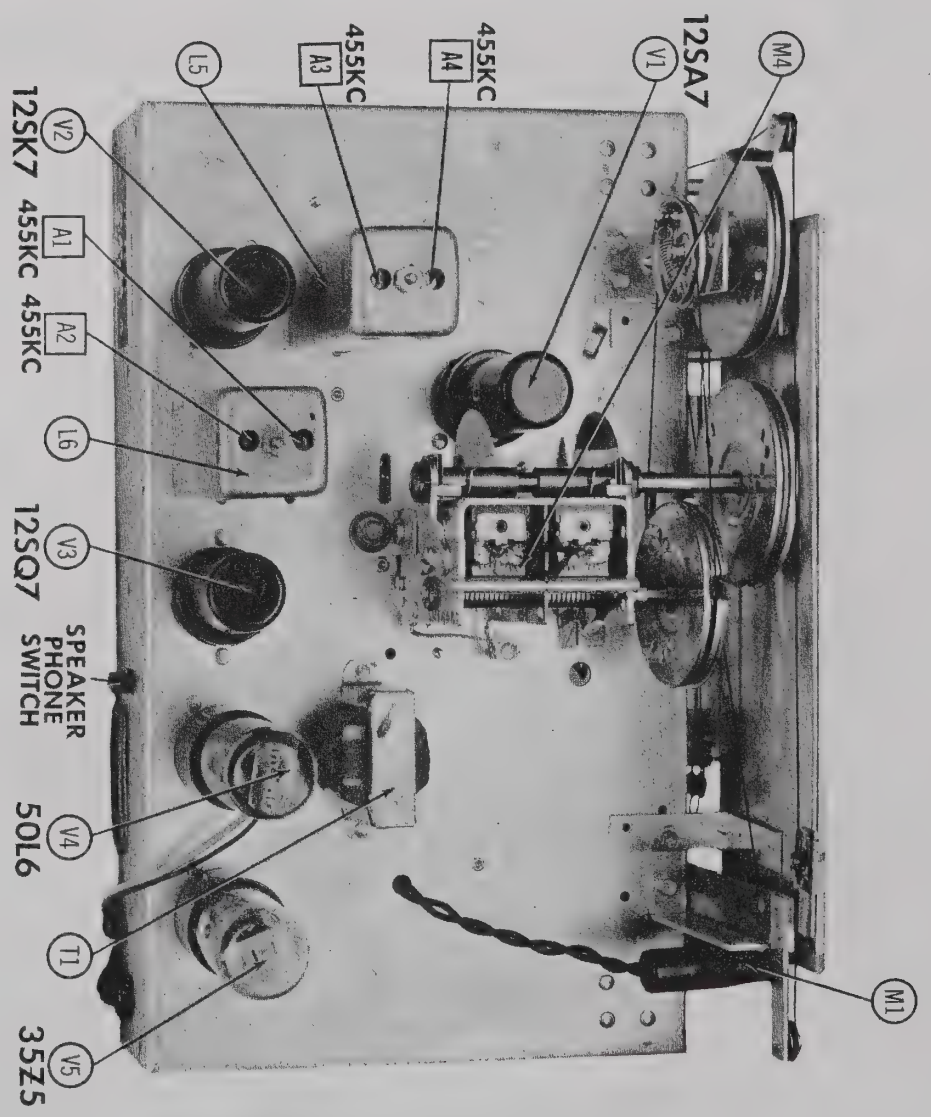
ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA HALLICRAFTER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	60	150	45B091	PRS150/40-40		EZ55515C		TVA-3451	Filter (Red)
				40					
B	40	150		PRS25/25				TVA-1205	Filter (Yellow)
C	40	150							Decoupling (Yellow)
D	20	25							Output Cathode (Blue)
C2	2700	500	47X30B272J	1464-003		1R5D3		MS-23	Fixed Padder
C3	220	500	47B2022lK5	1468-00025	D6-221	5W5T25	GP2K-221	IFM-325	RF Coupling
C4	5000		47A168	BPD-005	DD-502	1D5D5	811-005	5HK-D5	Conv. Plate Dec.
C5	220	500	47X20B221K	1469-00025		5R5T25			Osc. Grid Cap.
C6	3000	500	47X30B302J	1464-003		1R5D3		MS-23	Fixed Padder
C7	2200	500	47X30B222J	1464-0025		1R5D25			Fixed Padder
C8	5000		47A168	BPD-005	DD-502	1D5D5	811-005	5HK-D5	Osc. Feedback
C9	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	AVC Filter
C10	.1	600	46AZ104J	P688-1	DF-104	PTE6P1		6TM-P1	IF Amp. Decoupling
C11	.05	200	46AU503J	P288-05	DF-503	PTE4S5		2TM-S5	IF Amp. Cathode Bypass
C12	220	500	47B2022lK5	1468-00025	D6-221	5W5T25	GP2K-221	IFM-325	Diode RF Filter †
C13A	220			SI220	D6-221	5W5T25	GP2K-221		Diode RF Filter
B	.002			P688-002	D6-202	PTE6D2	GP2-333-202		Audio Coupling
C	220		46A151	SI220	D6-221	5W5T25	GP2K-221	34C3	AF Amp. Plate
D	.005			P688-005	D6-502	PTE6D5	GP2-333-502		Audio Coupling
C14	.01	600	46AZ103J	P688-01	D6-103	PTE6S1	GP2-333-103	6TM-S1	Audio Coupling
C15	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	Power Output Plate
C16	.02	400	46BR203LG	P488-02	DF-203	PTE4S2		4TM-S2	Line Filter
C17	.05	600	46AY503J	P688-05	DF-503	PTE6S5		6TM-S5	Line Isolation

† Some models use 100MMF in this application (Part No. 47X220B101K)

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Hallicrafters PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	2 Meg	½	25B896	Q13-139	AG-66-Z	AN-76	Volume Control
B	Shaft		Not Req.	Not Req.	RS-2	AK-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SWB	K-155	Attach to R1A per instructions

CHASSIS—TOP VIEW



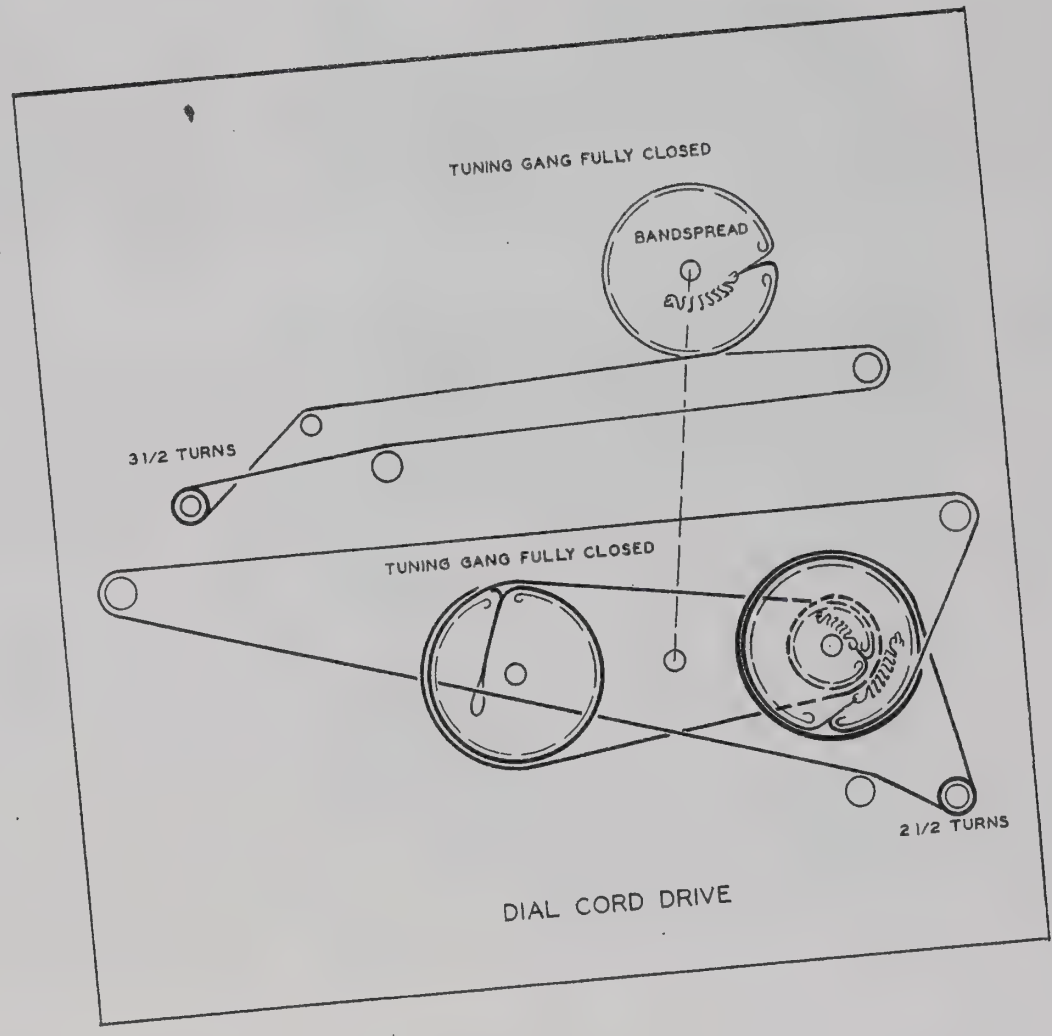
PARTS LIST AND DESCRIPTIONS (Continued)

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					Hallicrafters PART No.		
M1	Bayonet	6-8	.15	Brown	39A004		Type number 47.

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
M2	Switch	60C393	Band Selector
M3	Switch	60A243	Speaker
M4	2 Gang Var. Cap.	48-269	(16-440 MMF, 16-140 MMF)
A6	Trimmer	44A039	(3-77MMF) Ant. (Band #4)
A13	Trimmer	44A349	(525 MMF) Osc. Padder
	Cabinet	66-702	
	Dial Scale	22B318	Bandspread
	Pointer	82A198	Main Tuning
	Pointer	82A199	Bandspread, Off/Volume, Tuning
	Knob	15B322	Band Selector
	Knob	15B323	



DIAL CORD DRIVE

HALLICRAFTERS
MODEL 5R10A



HALLICRAFTERS
MODEL 5R10A

TRADE NAME	Hallicrafters Model 5R10A
MANUFACTURER	Hallicrafters C., Inc., 4401 W. 5th Ave., Chicago Ill.
TYPE SET	AC-DC Operated Multi-Band Superheterodyne Receiver
TUBES (five)	Types 12SA7 Conv., 12SK7 IF Amp., 12SQ7 Det.-AVC-AF Amp. 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE	(Band #1) 540-1650KC, (Band #2) 1, 65-5.1MC, (Band #3) 5-14.5 MC, (Band#4) 13-31 MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning gang fully closed and set pointer to the reference mark to the left of 55 on the BC scale.
To set band spread pointer, turn bandspread tuning gang fully open and set pointer to zero on the reference scale.
The RMA dummy antenna referred to in the alignment table consists of a 200 MMF capacitor in series with a 20 microhenry choke which is shunted by a 400MMF capacitor in series with a 400Ω carbon resistor.
Turn the bandspread dial to zero on the reference scale.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to stator on front section of tuning gang. Low side to chassis.	455KC (400Ω Mod.	1	1000KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .0001MFD to reduce hum modulation.
2.	RMA	High side thru dummy to antenna terminal A1(connect jumper between A2 and G) Low sideto chassis.	30MC	4	30MC	"	A5, A6	Adjust for maximum output. Rock tuning gang while adjusting A6.
3.	"	"	14MC	3	14MC	"	A7, A8	Adjust for max. output. Rock tuning gang while adjusting A7.
4.	"	"	5MC	2	5MC	"	A9, A10	Adjust for maximum output. Rock tuning gangwhile adjustingA9.
5.	"	"	1500KC	1	1500KC	"	A11, A12	Adjust for maximum output.
6.	"	"	600KC	1	600KC	"	A13	Repeat steps 5&6 until no further improvements can be made.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	INSTALLATION NOTES
		HALLICRAFTER PART No.	STANDARD REPLACEMENT		
V1	Converter	90X12SA7	12SA7	8R	
V2	IF Amplifier	90X12SK7	12SK7	8N	
V3	Detector-AVC-AF Amplifier	90X12SQ7GT	12SQ7GT	8Q	
V4	Power Output	90X50L6GT	50L6GT	7AC	
V5	Rectifier	90X35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

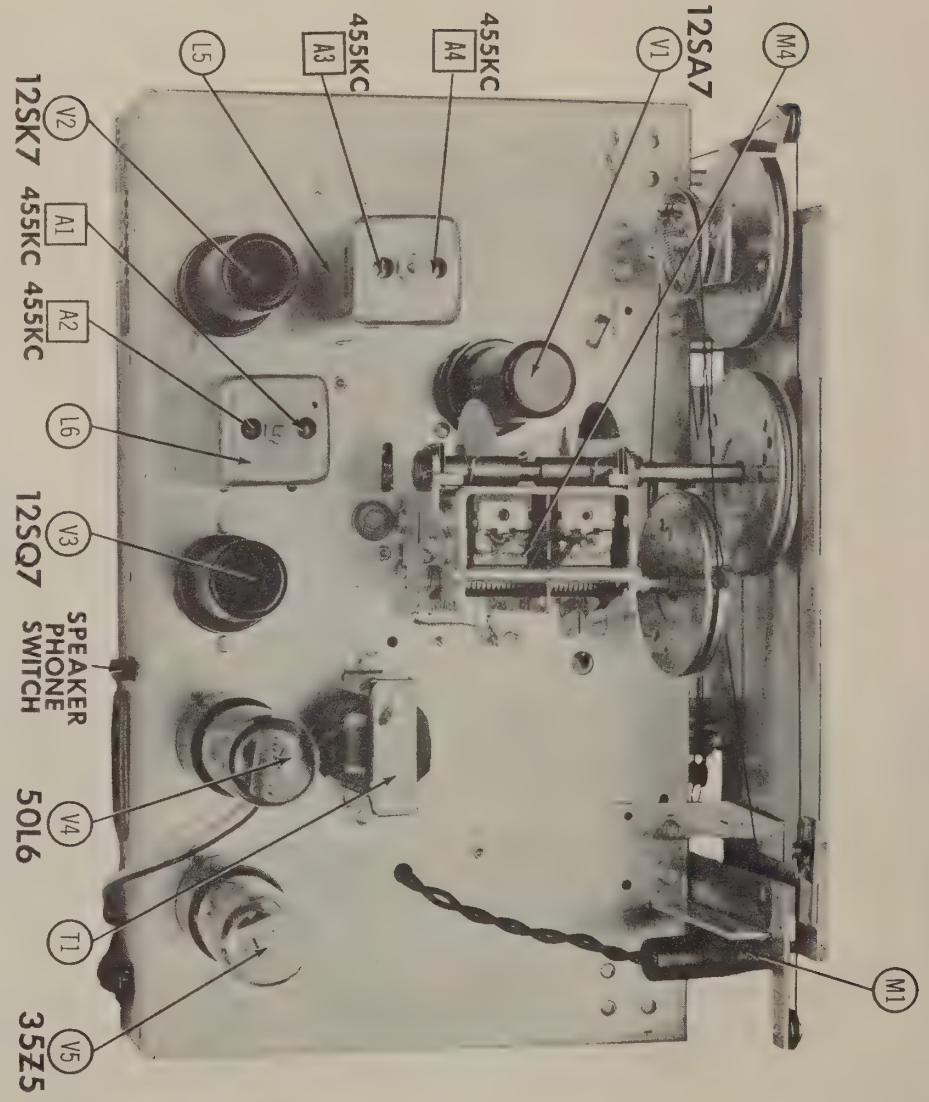
ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	HALLICRAFTER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	60	150	45B091	PRS150/40-40-40		EZ55515C		TVA-3451	Filter (Red)
B	40	150		PRS25/25				TVA-1205	Filter (Yellow)
C	40	150							Decoupling (Yellow)
D	20	25							Output Cathode (Blue)
C2	2700	500	47X30B272J	1464-003		1R5D3		MS-23	Fixed Padder
C3	220	500	47B20221K5	1468-00025	D6-221	5W5T25	GP2K-221	1FM-325	RF Coupling
C4	5000		47A168	BPD-005	DD-502	1D5D5	811-005	5HK-D5	Conv. Plate Dec.
C5	220	500	47X20B221K	1469-00025		5R5T25			Osc. Grid Cap.
C6	3000	500	47X30B302J	1464-003		1R5D3		MS-23	Fixed Padder
C7	2200	500	47X30B222J	1464-0025		1R5D25			Fixed Padder
C8	5000		47A168	BPD-005	DD-502	1D5D5	811-005	5HK-D5	Osc. Feedback
C9	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	AVC Filter
C10	.1	600	46AZ104J	P688-1	DF-104	PTE6P1		6TM-P1	IF Amp. Decoupling
C11	.05	200	46AU503J	P288-05	DF-503	PTE4S5		2TM-S5	IF Amp. Cathode Bypass
C12	220	500	47B20221K5	1468-00025	D6-221	5W5T25	GP2K-221	1FM-325	Diode RF Filter †
C13A	220			SI220	D6-221	5W5T25	GP2K-221		Diode RF Filter
B	.002			P688-002	D6-202	PTE6D2	GP2-333-202		Audio Coupling
C	220		46A151	SI220	D6-221	5W5T25	GP2K-221	34C3	AF Amp. Plate
D	.005			P688-005	D6-502	PTE6D5	GP2-333-502		Audio Coupling
C14	.01	600	46AZ103J	P688-01	D6-103	PTE6S1	GP2-333-103	6TM-S1	Audio Coupling
C15	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	Power Output Plate
C16	.02	400	46BR203LG	P488-02	DF-203	1PTE4S2		4TM-S2	Line Filter
C17	.05	600	46AY503J	P688-05	DF-503	PTE6S5		6TM-S5	Line Isolation

† Some models use 100MMF in this application (Part No. 47X220B101K)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	Hallicrafters PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R1A	2 Meg	½	25B896	Q13-139	AG-66-Z	AN-76	Volume Control
B	Shaft		Not Req.	Not Req.	RS-2	AK-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SWB	K-155	Attach to R1A per instructions

CHASSIS—TOP VIEW



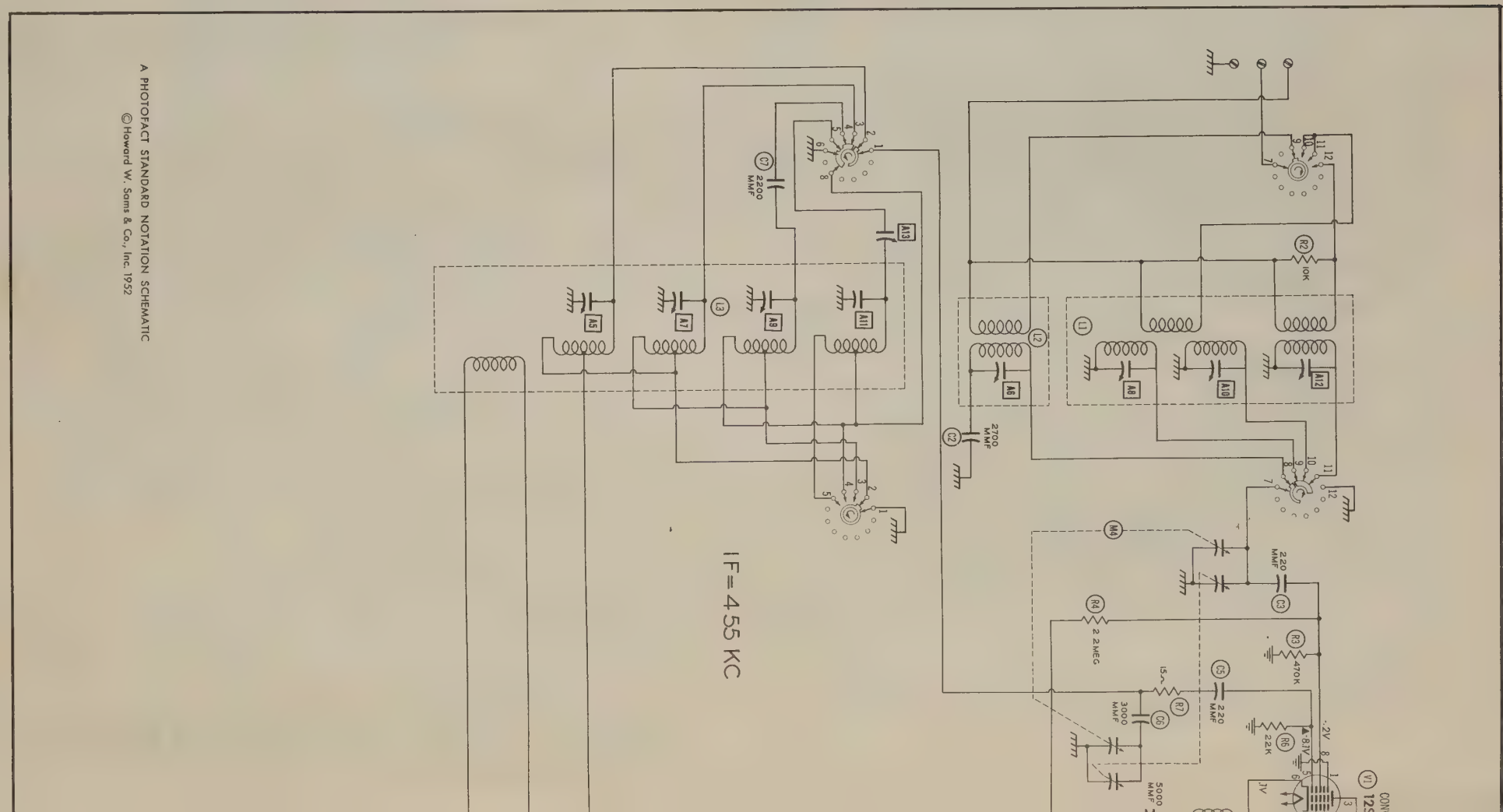
PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTER PART No.	IRC PART No.	
R2	10KΩ	½	23X20X103M	BTS-10K	Antenna Coil Shunt.
R3	470KΩ	½	23X20X474M	BTS-470K	Converter Grid.
R4	2.2Meg	½	23X20X225M	BTS-2.2Meg	AVC Network

CHASSIS—BOTTOM VIEW





PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HALLICRAFTER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	INSTALLATION NOTES
V1	Converter	90X12SA7	12SA7	8R	
V2	IF Amplifier	90X12SK7	12SK7	8N	
V3	Detector-AVC-AF Amplifier	90X12SQ7GT	12SQ7GT	8Q	
V4	Power Output	90X50L6GT	50L6GT	7AC	
V5	Rectifier	90X35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

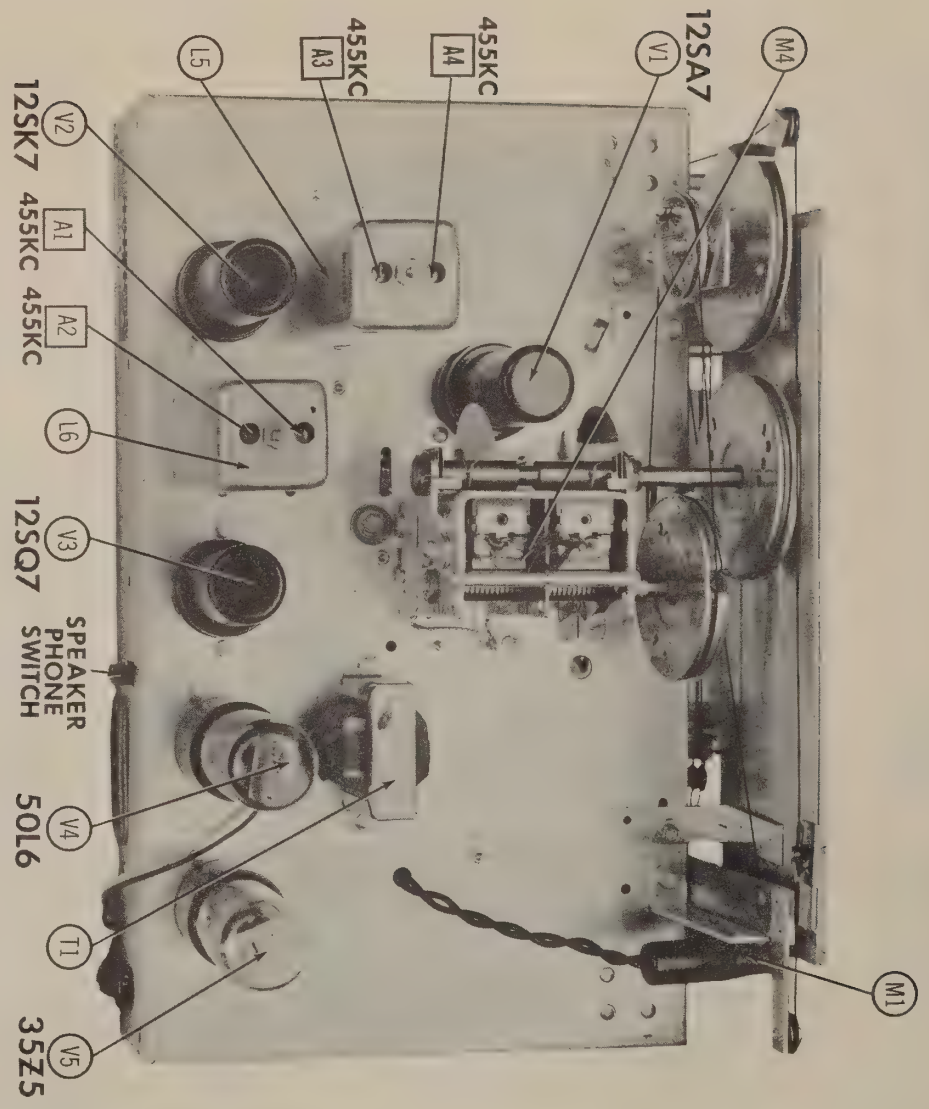
ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: HALLICRAFTER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	60	150	45B091	PRS150/40-40		EZ55515C		TVA-3451	Filter (Red)
B	40	150		PRS25/25				TVA-1205	Filter (Yellow)
C	40	150							Decoupling (Yellow)
D	20	25							Output Cathode (Blue)
C2	2700	500	47X30B272J	1464-003		1R5D3		MS-23	Fixed Padder
C3	220	500	47B20221K5	1468-00025	D6-221	5W5T25	GP2K-221	1FM-325	RF Coupling
C4	5000		47A168	BPD-005	DD-502	1D5D5	811-005	5HK-D5	Conv. Plate Dec.
C5	220	500	47X20B221K	1469-00025		5R5T25			Osc. Grid Cap.
C6	3000	500	47X30B302J	1464-003		1R5D3		MS-23	Fixed Padder
C7	2200	500	47X30B222J	1464-0025		1R5D25			Fixed Padder
C8	5000		47A168	BPD-005	DD-502	1D5D5	811-005	5HK-D5	Osc. Feedback
C9	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	AVC Filter
C10	.1	600	46AZ104J	P688-1	DF-104	PTE6P1		6TM-P1	IF Amp. Decoupling
C11	.05	200	46AU503J	P288-05	DF-503	PTE4S5		2TM-S5	IF Amp. Cathode Bypass
C12	220	500	47B20221K5	1468-00025	D6-221	5W5T25	GP2K-221	1FM-325	Diode RF Filter †
C13A	220			SI220	D6-221	5W5T25	GP2K-221		Diode RF Filter
B	.002			P688-002	D6-202	PTE6D2	GP2-333-202		Audio Coupling
C	220		46A151	SI220	D6-221	5W5T25	GP2K-221	34C3	AF Amp. Plate
D	.005			P688-005	D6-502	PTE6D5	GP2-333-502		Audio Coupling
C14	.01	600	46AZ103J	P688-01	D6-103	PTE6S1	GP2-333-103	6TM-S1	Audio Coupling
C15	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	Power Output Plate
C16	.02	400	46BR203LG	P488-02	DF-203	PTE4S2		4TM-S2	Line Filter
C17	.05	600	46AY503J	P688-05	DF-503	PTE6S5		6TM-S5	Line Isolation

† Some models use 100MMF in this application (Part No. 47X220B101K)

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: Hallicrafters PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	2 Meg	½	25B896	Q13-139	AG-66-Z	AN-76	Volume Control
B	Shaft		Not Req.	Not Req.	RS-2	AK-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SWB	K-155	Attach to R1A per instructions

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HALLICRAFTER PART No.	IRC PART No.	
R2	10KΩ	½	23X20X103M	BTS-10K	Antenna Coil Shunt.
R3	470KΩ	½	23X20X474M	BTS-470K	Converter Grid.
R4	2.2Meg	½	23X20X225M	BTS-2.2Meg	AVC Network
R5	2.2Meg	½	23X20X225M	BTS-2.2Meg	AVC Network
R6	22KΩ	½	23X20X223M	BTS-22K	Oscillator Grid
R7	15Ω	½	23X20X150M		Parasitic Suppressor-See note
R8	22Ω	½	23X20X220M		Parasitic Suppressor
R9	390Ω	½	23X20X391K	BTS-390	IF Cathode
R10	390Ω	½	23X20X391K	BTS-390	IF Amplifier Decoupling
R11	47KΩ	½	23X20X473M	BTS-47K	Diode Filter
R12	470KΩ	½	23X20X474M	BTS-470K	Diode Filter
R13	10Meg	½	23X20X106M	BTS-10Meg	AF Amplifier Grid
R14	220KΩ	½	23X20X224M	BTS-220K	AF Amplifier Plate
R15	470K	½	23X23X474M	BTS-470K	Output Grid
R16	150Ω	½	23X20X151K	BTS -150K	Output Cathode
R17	220Ω	1	25X20X221M	BTA-220	Filter
R18	1000Ω	½	23X20X102Ω	BTS-1000	Filter
R19	22Ω	½	23X20X220M		Surge Limiter
R20	15Ω	½	23X20X150Ω		Head Phone Shunt
R21	15Ω	½	2 3X20X150Ω		Series Dial Light

NOTE: Some models use 10Ω resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		Hallicrafters PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	1.7KΩ	3.2Ω	147Ω	.8Ω	55A127	A-3876	A2928	R0-2	

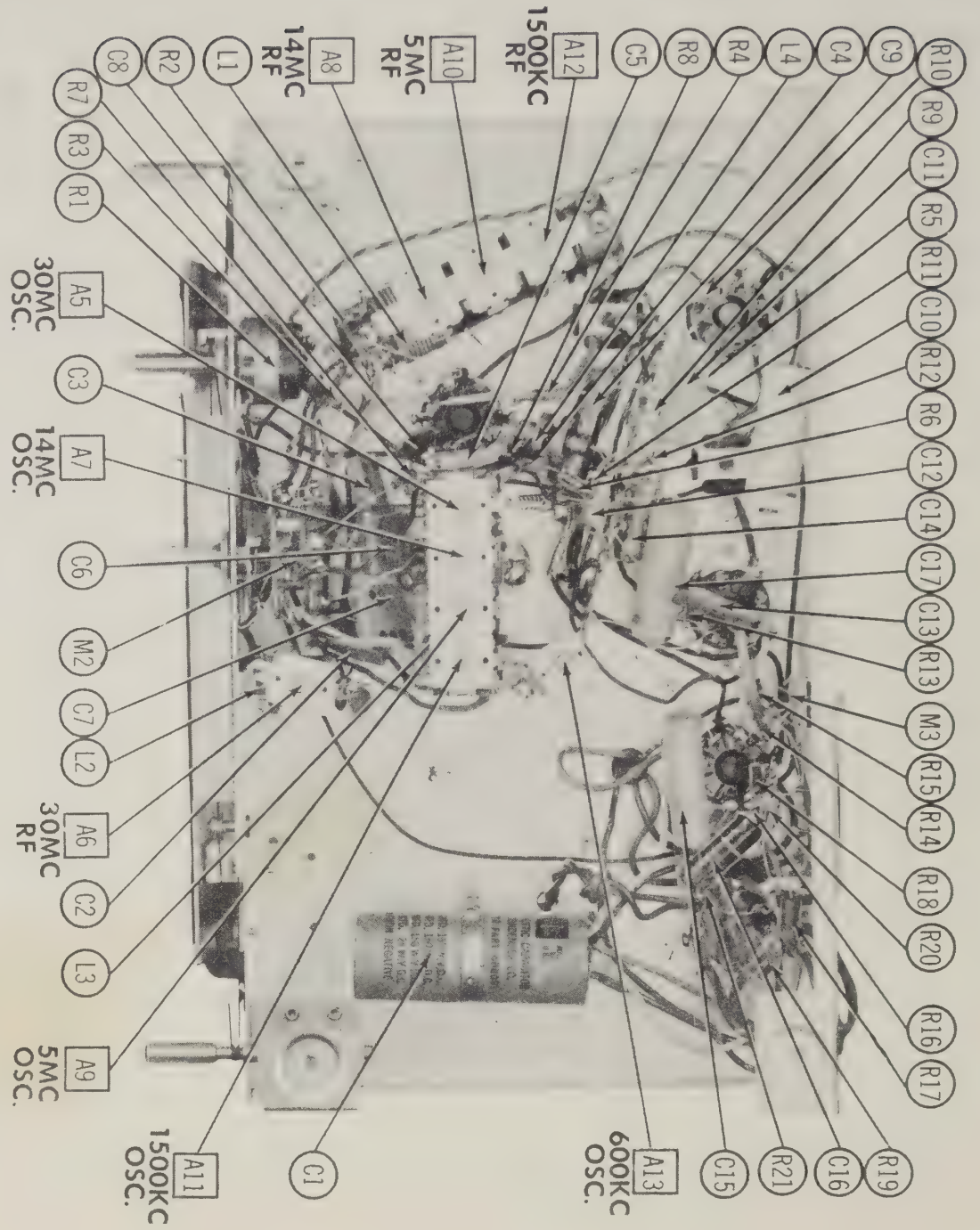
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD	V. C. IMP.	Hallicrafters PART No.	JENSEN PART No.	QUAM PART No.	
SP1	P.M.	3.2Ω	85C030	ST-105 Mod P5-X	5A1	
	CONE DIA.	V. C. DIA.				
SP2	4½ in.	9/16 in.				

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	Hallicrafters PART No.	MERIT PART No.	
L1A	Ant. Coil	27Ω	0Ω	51C821		Band 1
B	Ant. Coil	1Ω	0Ω			Band 2
C	Ant. Coil		0Ω			Band 3
L2	Ant. Coil	.2Ω	0Ω	51B1015		Band 4
L3A	Osc. Coil	2.4Ω		51C822		Band 1 Tap at 2Ω
B	Osc. Coil	2Ω				Band 2 Tap at 2Ω
C	Osc. Coil	0Ω				Band 3
D	Osc. Coil	0Ω	0Ω			Band 4
L4	RF Choke	9.3Ω		53A107		
L5	Input IF	20Ω	20Ω	50B183		
L6	Output IF	20Ω	20Ω	50B184		

CHASSIS—BOTTOM VIEW



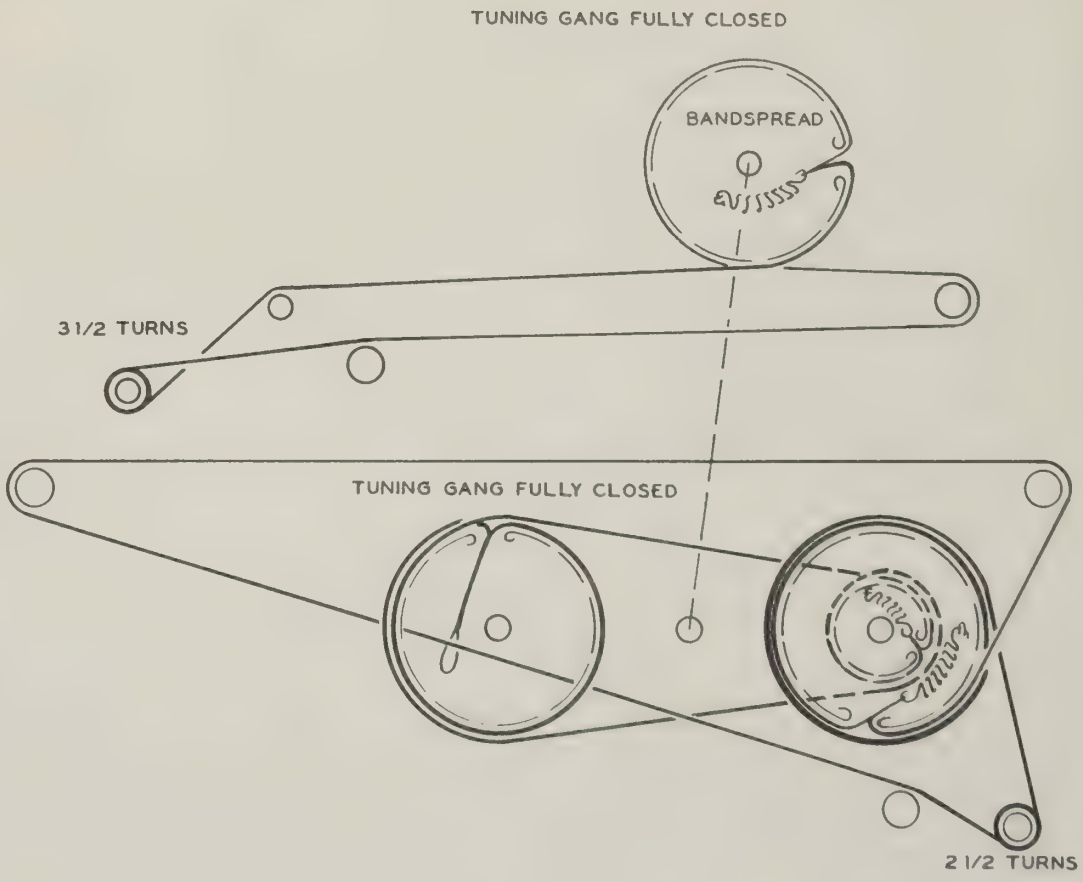
PARTS LIST AND DESCRIPTIONS (Continued)

DIAL LIGHTS

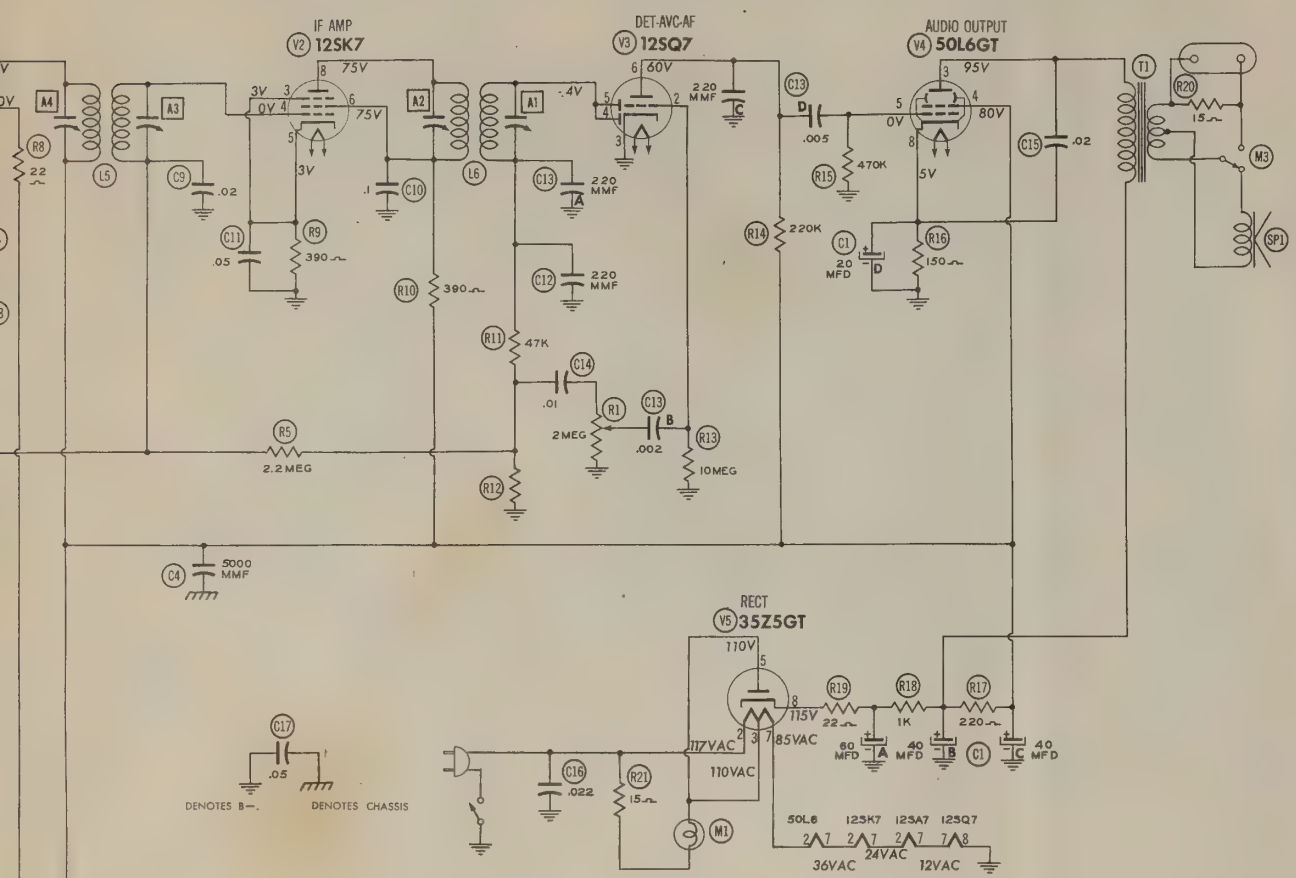
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					Hallicrafters PART No.		
M1	Bayonet	6-8	.15	Brown	39A004		Type number 47.

MISCELLANEOUS

ITEM No.	PART NAME	HALLICRAFTERS PART No.	NOTES
M2	Switch	60C393	Band Selector
M3	Switch	60A243	Speaker
M4	2 Gang Var. Cap.	48-269	(16-440 MMF, 16-140 MMF)
A6	Trimmer	44A039	(3-77MMF) Ant. (Band #4)
A13	Trimmer	44A349	(525 MMF) Osc. Padder
	Cabinet	66-702	
	Dial Scale	22B318	
	Pointer	82A198	Bandspread
	Pointer	82A199	Main Tuning
	Knob	15B322	Bandspread, Off/Volume, Tuning
	Knob	15B323	Band Selector



DIAL CORD DRIVE



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7	■ 0Ω	24Ω	†1.2KΩ	†1.3KΩ	22 KΩ	10Ω	12Ω	470KΩ
V 2	12SK7	■0Ω	36Ω	390Ω	1.2Meg	390Ω	†1.6KΩ	24Ω	†1.6KΩ
V 3	12SQ7	■0Ω	10Meg	0Ω	515KΩ	515KΩ	†220KΩ	12Ω	0Ω
V 4	50L6GT	INF	86Ω	†390Ω	†1.2KΩ	470KΩ	0Ω	36Ω	150Ω
V 5	35Z5GT	INF	121Ω	105Ω	105Ω	105Ω	INF	86Ω	40KΩ

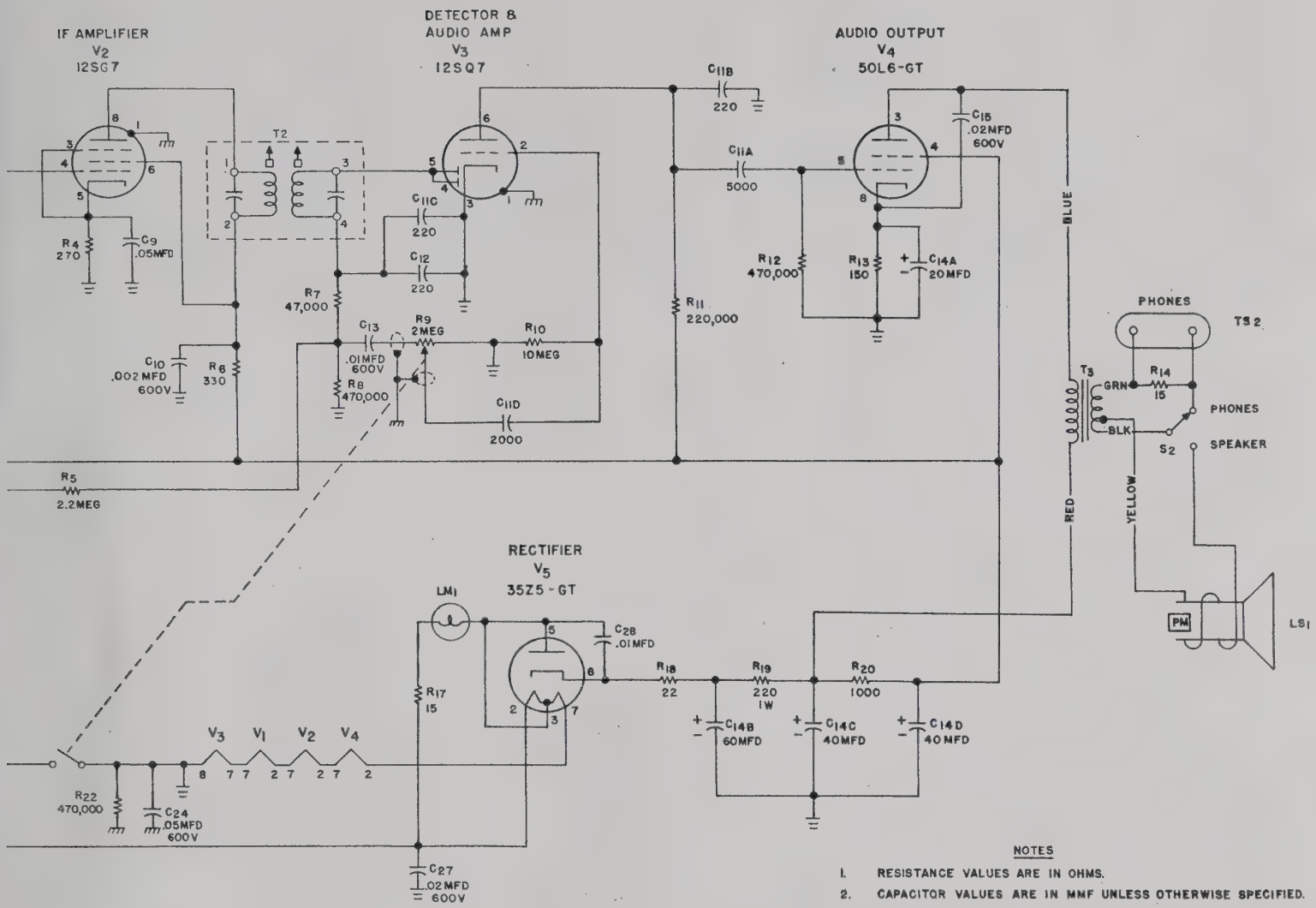
▲ TAKEN WITH VACUUM TUBE VOLTMETER
ALL MEASUREMENTS TAKEN IN BC BAND (1)
† MEASURED FROM PIN 8 OF V5
■ MEASURED FROM CHASSIS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

MODELS 5R10A and 5R100A

RUN 4



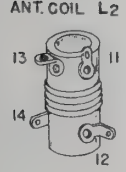
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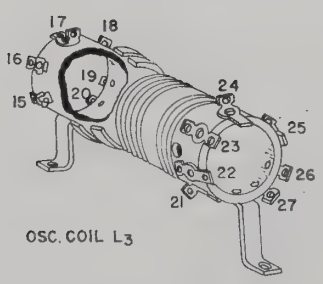
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2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH (S1) SHOWN IN BAND 4 POSITION.

⏚ ELECTRICAL GROUND BUS (B-)

⏚ CHASSIS GROUND

LAST CAPACITOR SYMBOL C-28
LAST RESISTOR SYMBOL R-23

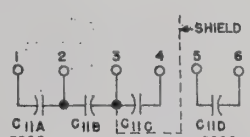




OSC. COIL L3



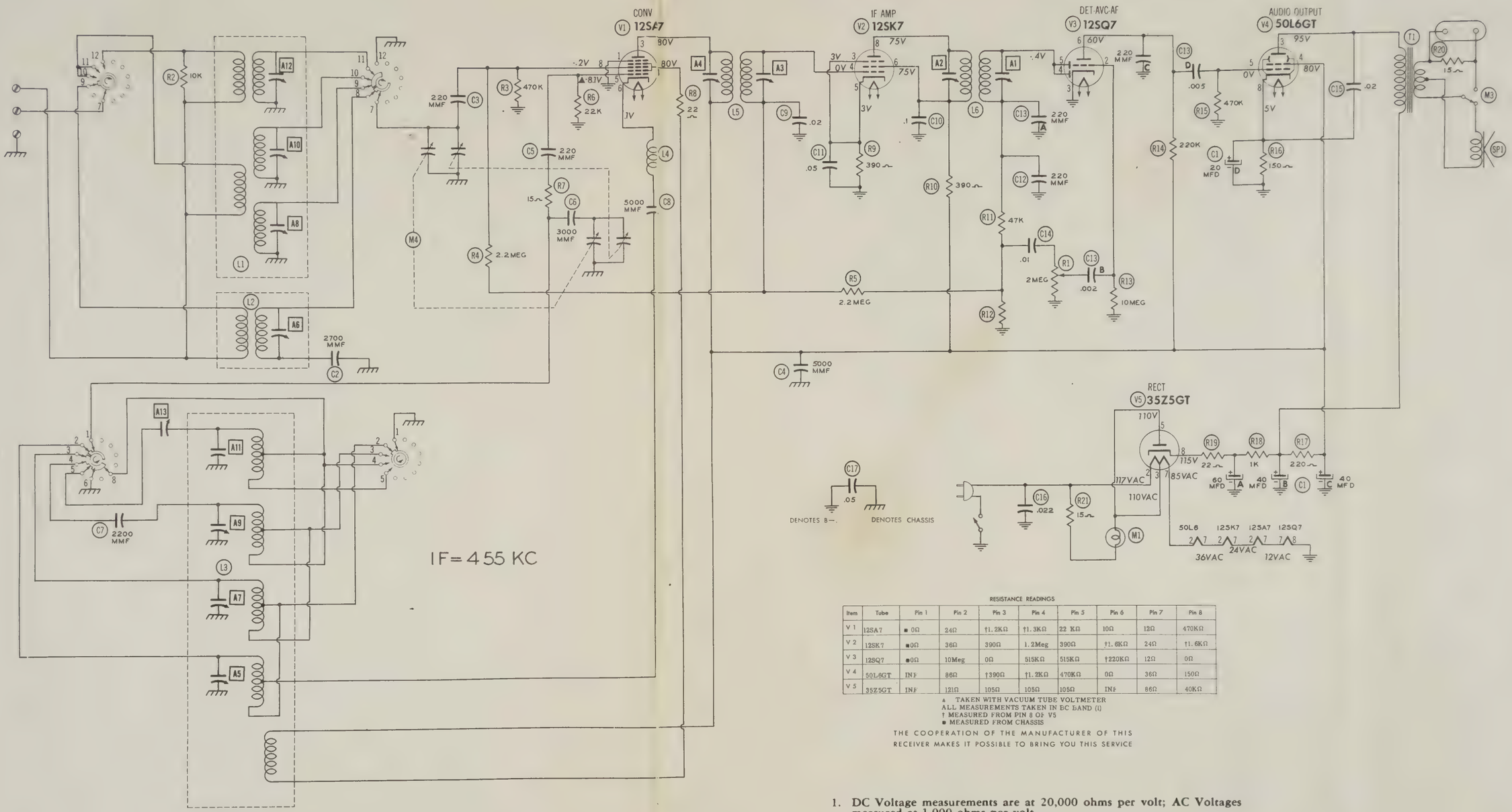
CAPACITOR C11



89E379-E

CES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND.
THAT THE VALUES OF ANY REPLACEMENT CORRESPOND
LUE OF THE PART BEING REPLACED.

Fig. 9. Schematic Diagram



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7	■ 0Ω	24Ω	†1.2KΩ	†1.3KΩ	22 KΩ	10Ω	12Ω	470KΩ
V 2	12SK7	■0Ω	36Ω	390Ω	1.2Meg	390Ω	†1.6KΩ	24Ω	†1.6KΩ
V 3	12SQ7	■0Ω	10Meg	0Ω	515KΩ	515KΩ	†220KΩ	12Ω	0Ω
V 4	50L6GT	INF	86Ω	†390Ω	†1.2KΩ	470KΩ	0Ω	36Ω	150Ω
V 5	35Z5GT	INF	121Ω	105Ω	105Ω	105Ω	INF	86Ω	40KΩ

▲ TAKEN WITH VACUUM TUBE VOLTMETER
ALL MEASUREMENTS TAKEN IN BC BAND (1)
† MEASURED FROM PIN 8 OF V5
■ MEASURED FROM CHASSIS

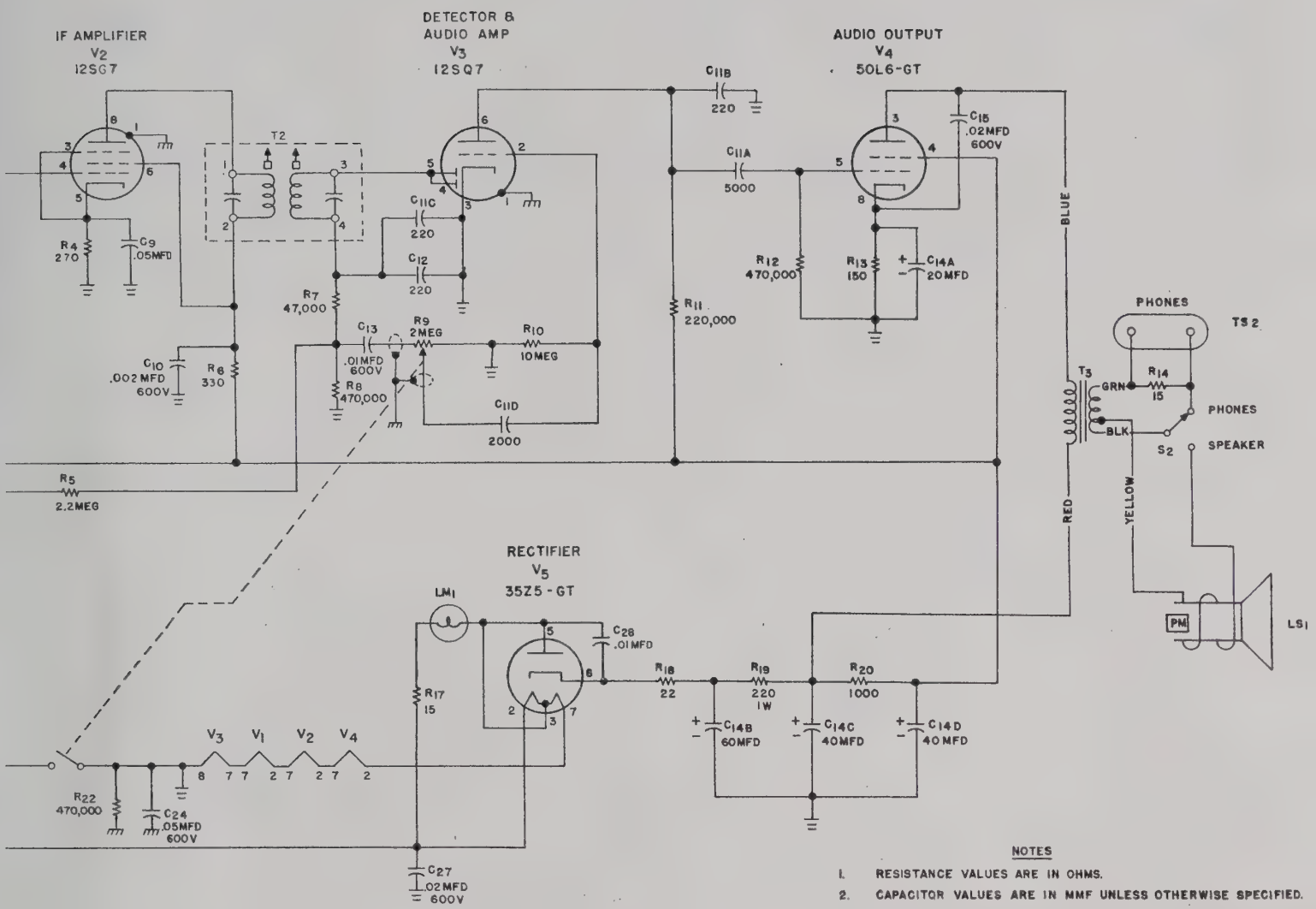
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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A PHOTOFACT STANDARD NOTATION SCHEMATIC
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MODELS 5R10A and 5R100A

RUN 4



NOTES

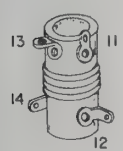
1. RESISTANCE VALUES ARE IN OHMS.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH (S1) SHOWN IN BAND 4 POSITION.

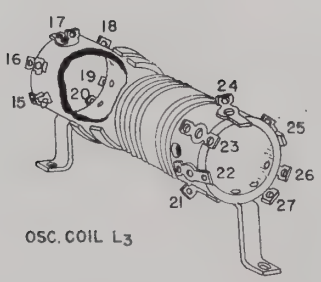
⏚ ELECTRICAL GROUND BUS (B-)

⏚ CHASSIS GROUND

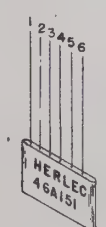
LAST CAPACITOR SYMBOL C-28
LAST RESISTOR SYMBOL R-23

ANT. COIL L2

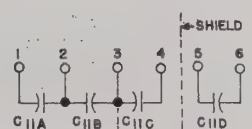




OSC. COIL L3



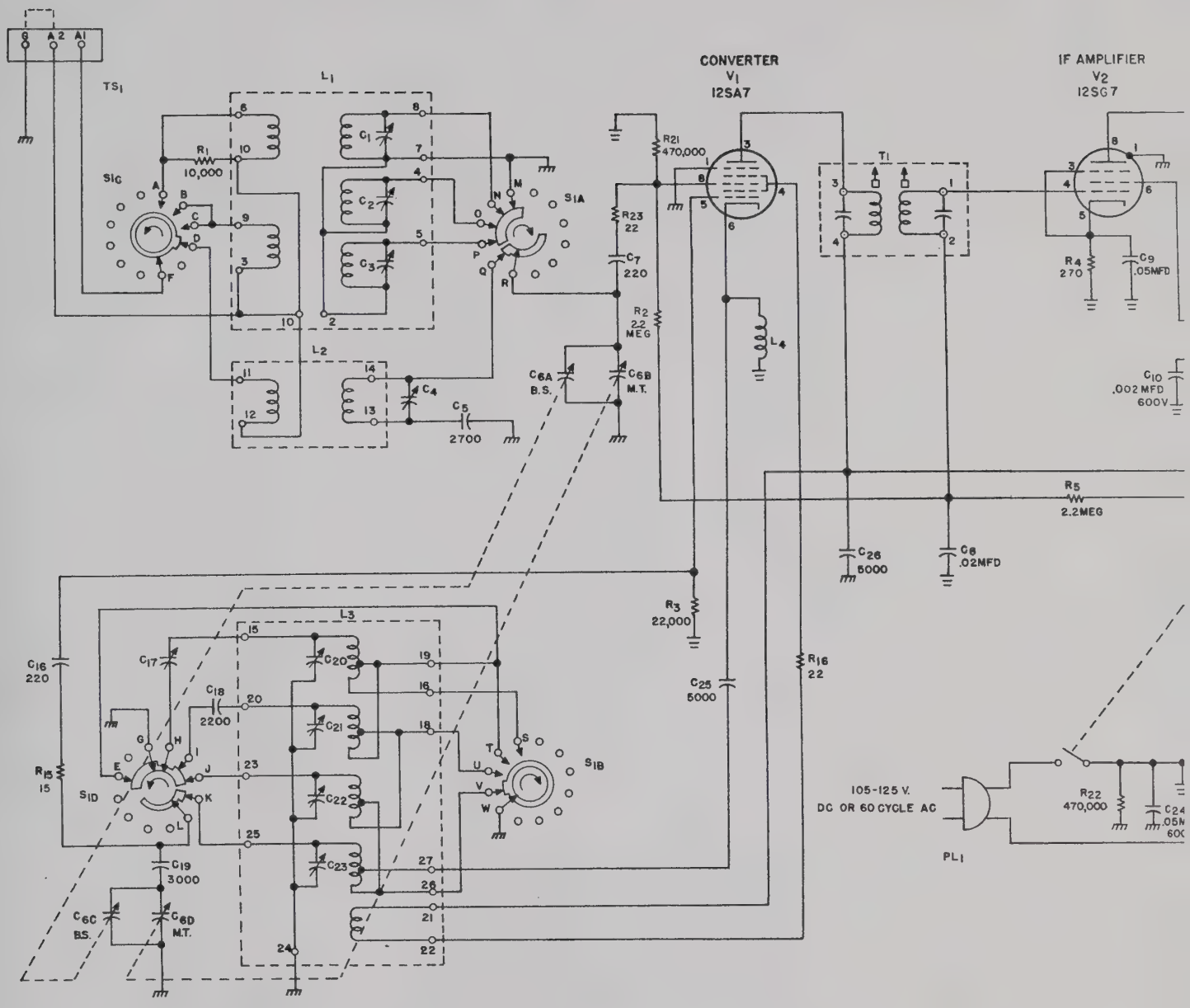
CAPACITOR C11

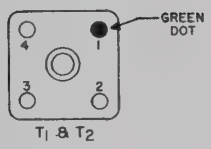


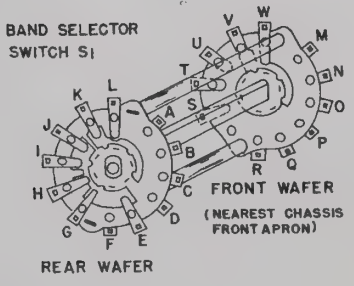
89E379-E

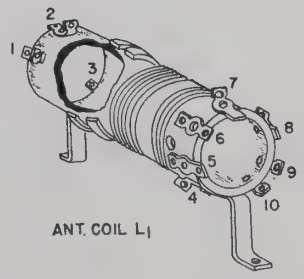
ES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND.
THAT THE VALUES OF ANY REPLACEMENT CORRESPOND
LUE OF THE PART BEING REPLACED.

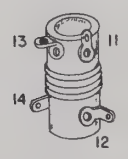
Fig. 9. Schematic Diagram



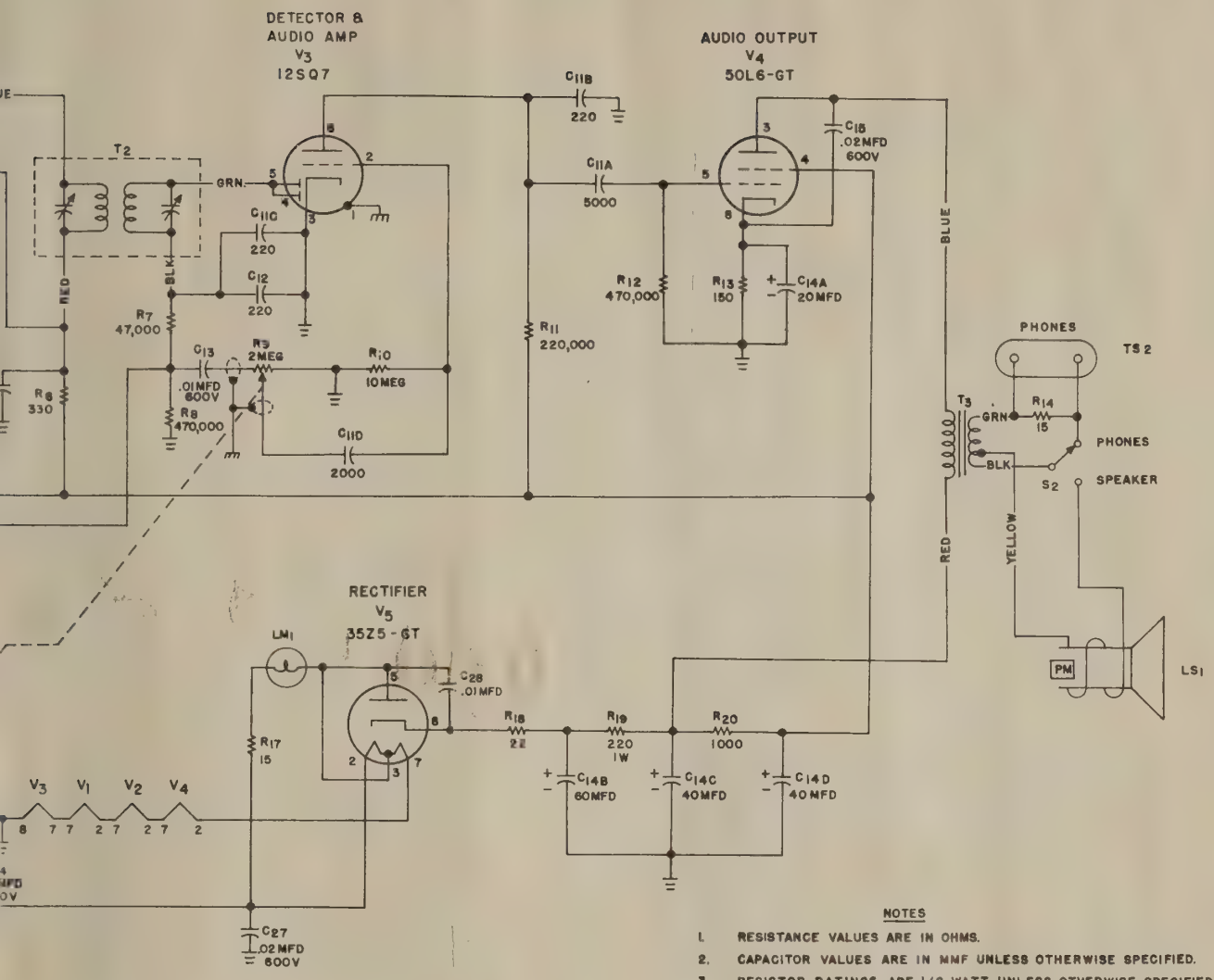








NOTE: VALUES & TOLERANCES SHOWN ARE NOMINAL ANI
IT IS RECOMMENDED THAT THE VALUES OF ANY R
TO THE NOMINAL VALUE OF THE PART BEING REP



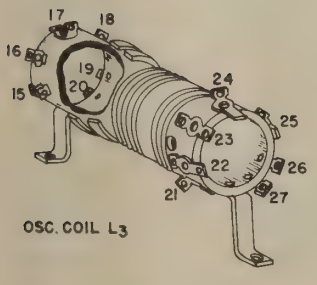
NOTES

1. RESISTANCE VALUES ARE IN OHMS.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH (S_1) SHOWN IN BAND 4 POSITION.

⏚ ELECTRICAL GROUND BUS (B-)

⏚ CHASSIS GROUND

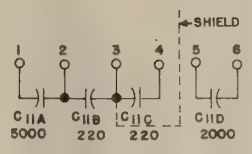
LAST CAPACITOR SYMBOL C-28
LAST RESISTOR SYMBOL R-23



OSC. COIL L3



CAPACITOR C_{11}



89E379-D

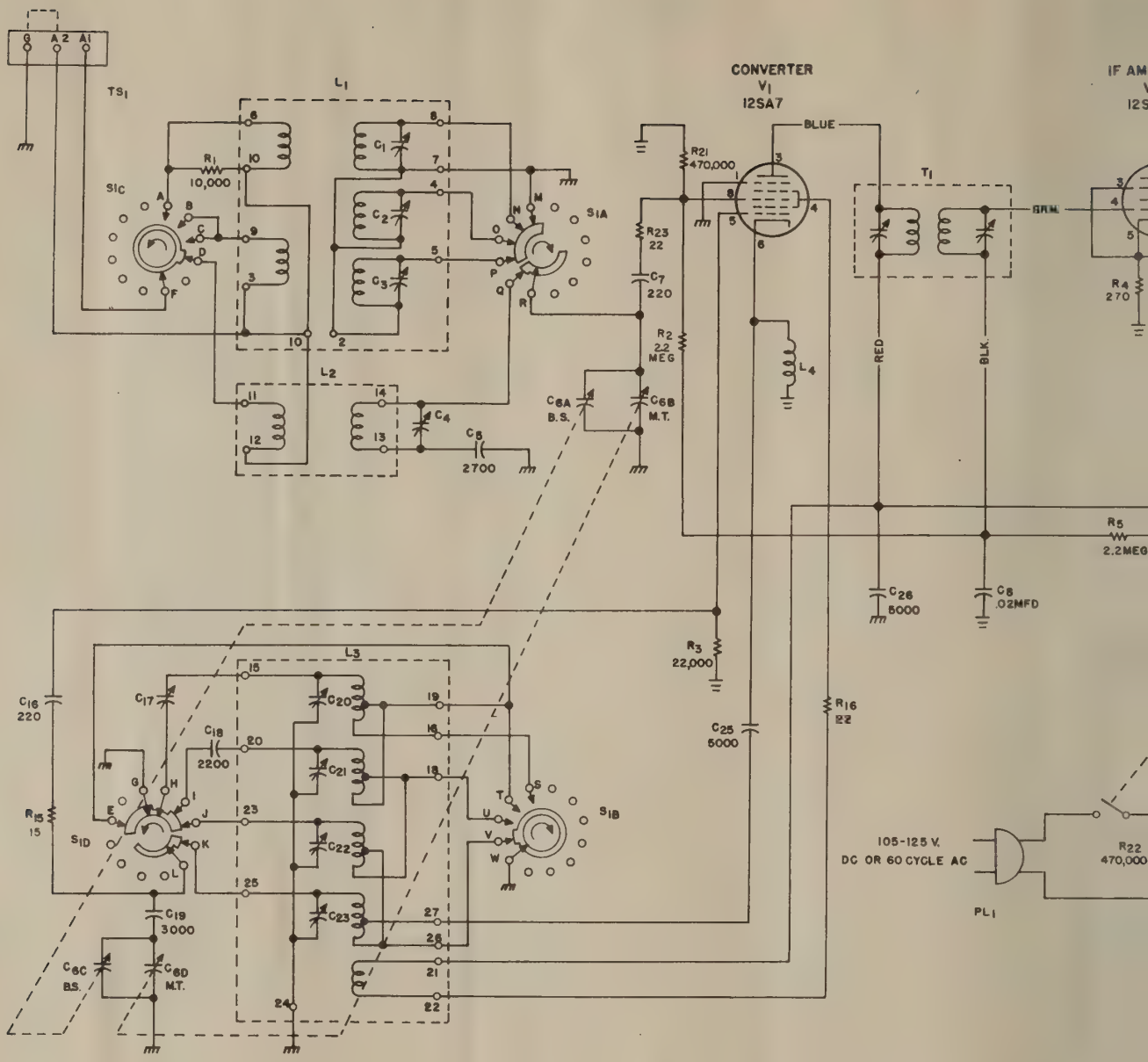
VARIATIONS MAY BE FOUND.
PLACEMENT CORRESPOND
ACED.

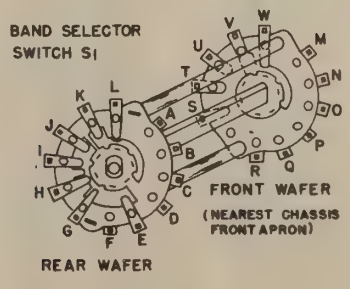
Fig. 9. Schematic Diagram

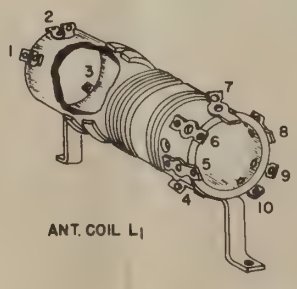
SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3	Trimmer, adjustable (part of antenna coil L-1)	- - - - - -
C-4	Trimmer, adjustable; 3-77 mmf.	44A039
C-5	2700 mmf. 5%, 500 V.; mica	47X30B272J
C-6A,B, C,D	Tuning capacitor; 2 gang	48-269
C-7,12,16	220 mmf. 10%, 500 V.; mica	47X20B221K
C-8,15	.02 mfd. 600 V., tubular paper	46AY203J
C-9	.05 mfd. 200 V., tubular paper	46AU503J
C-10	.002 mfd. 600 V., tubular paper	46AZ202F
C-11A,B, C,D	Capacitor, composite: 5000, dual 220 and 2000 mmf. 500 V.; ceramic	46A151
C-13	.01 mfd. 600 V., tubular paper	46AZ103J
C-14A,B, C,D,	60-40-40 mfd. 150 V., 20 mfd. 25 V., electrolytic	45B091
C-17	Padder, adjustable; 525 mmf.	44A349
C-18	2200 mmf. 5%, 500 V.; mica	47X30B222J
C-19	3000 mmf. 5%, 500 V.; mica	47X30B302J
C-20,21, 22,23	Trimmer, adjustable (part of oscillator coil L-3)	- - - - - -
C-24	.05 mfd. 600 V., tubular paper	46AY503J
C-25,26	5000 mmf. 450 V., ceramic disc	47A168
C-27	.02 mfd. 600 V., molded tubular paper	46BR203L6
C-28	.01 mfd. 450 V., ceramic disc	47A217
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103M
R-2,5	2.2 megohms 1/2 watt, carbon	23X20X225M
R-3	22,000 ohms 1/2 watt, carbon	23X20X223M
R-4	270 ohms 1/2 watt, carbon	23X20X271K
R-6	330 ohms 1/2 watt, carbon	23X20X331M
R-7	47,000 ohms 1/2 watt, carbon	23X20X473M
R-8,12, 21,22	470,000 ohms 1/2 watt, carbon	23X20X474M
R-9	2 megohms; VOLUME control	25B896
R-10	10 megohms 1/2 watt, carbon	23X20X106M
R-11	220,000 ohms 1/2 watt, carbon	23X20X224M
R-13	150 ohms 1/2 watt, carbon	23X20X151K
R-14,15, 17	15 ohms 1/2 watt, carbon	23X20X150M
R-16,18, 23	22 ohms 1/2 watt, carbon	23X20X220M
R-19	220 ohms 1 watt, carbon	23X30X221M
R-20	1000 ohms 1/2 watt, carbon	23X20X102M
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; bands 1, 2 and 3	51C821
L-2	Coil, antenna; band 4	51B1015
L-3	Coil, oscillator; all bands	51C822
L-4	Choke, RF	53A107
T-1	Transformer, 1st IF	50C531
T-2	Transformer, 2nd IF	50C532
T-3	Transformer, audio output	55A127

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1A,B, C,D	Bandswitch assembly; BAND SELECTOR	60C393
S-2	Switch, spdt; SPEAKER/ PHONES	60A243
S-3	Switch, power; spst (part of VOLUME control R-9)	- - - - - -
	SOCKETS AND CONNECTORS	
TS-1	Terminal strip, antenna	88A671
TS-2	Jack, PHONES	88A071
	Socket, dial lamp; with leads	86A122
	Socket, octal; tube	6A250
	TUBES AND DIAL LAMPS	
V-1	12SA7: converter	90X12SA7
V-2	12SG7: IF amplifier	90X12SG7
V-3	12SQ7: detector and audio amplifier	90X12SQ7
V-4	50L6GT: audio output	90X50L6GT
V-5	35Z5GT: rectifier	90X35Z5GT
LM-1	Lamp, dial; Mazda #47	39A004
	MISCELLANEOUS PARTS	
	Cabinet	66-702
	Cabinet back	32C500
	Channel, rubber (for escutcheon glass)	16A212
	Clip, dial mtg.	76A646
	Clip mtg. (for antenna coil L-2)	76A326
	Cover, cabinet bottom	32C501
	Dial background	32B488
	Dial cord (specify length)	38A026
	Dial scale	22B318
	Escutcheon	7C248
	Foot, mounting; rubber	16A244
	Glass, escutcheon	22B319
	Grommet, rubber	16A015
	Knob, BAND SELECTOR	15B323
	Knob, BANDSPREAD, OFF-VOLUME and TUNING	15B322
PL-1	Line cord and plug	87A078
	Line cord lock	76A397
	Pointer, dial; bandspread tuning	82A198
	Pointer, dial; main tuning	82A199
	Shield, dial lamp	8A1249
LS-1	Speaker, PM; 5 inch	85C030
	Spring, dial drive; 17/32"	75A012
	Spring, dial drive; 3/8"	75A173







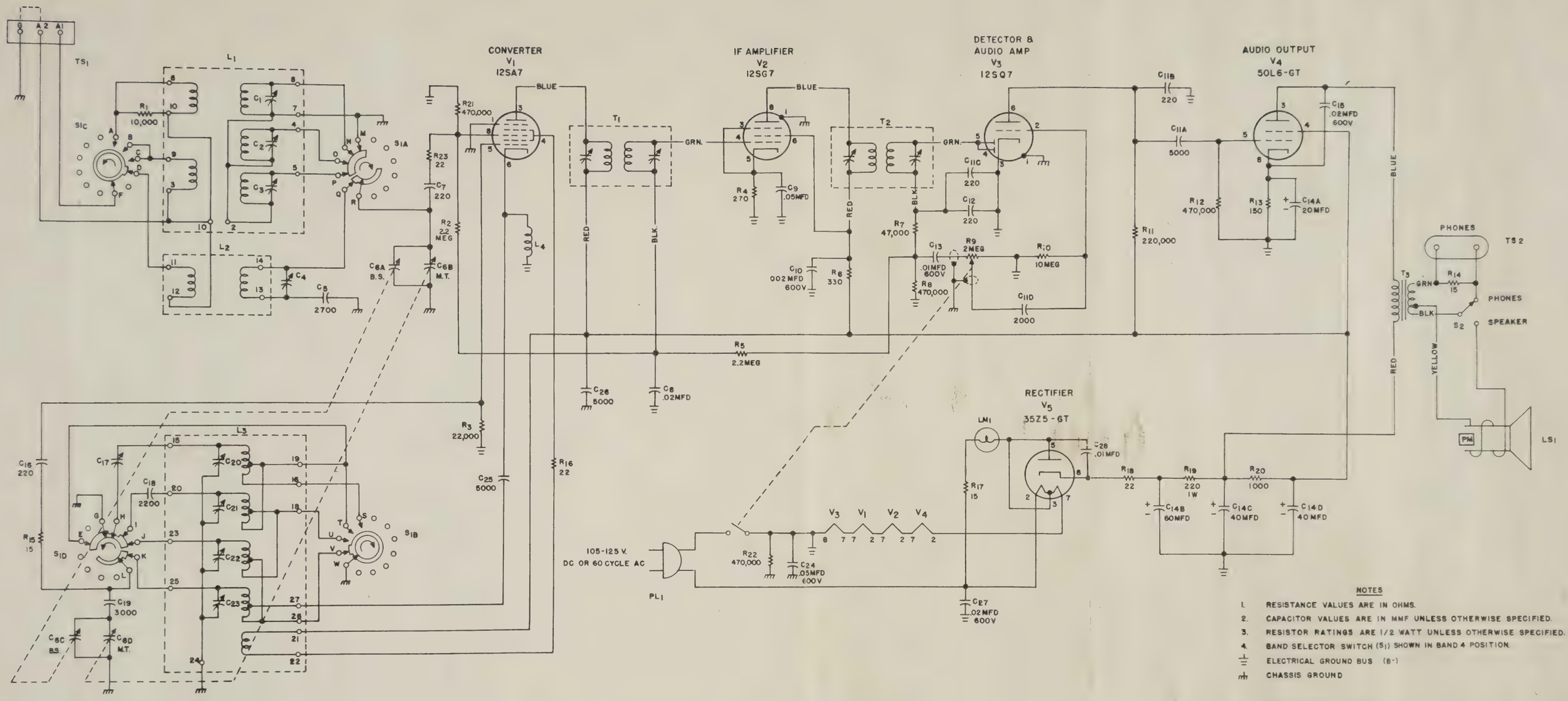


NOTE: VALUES & TOLERANCES SHOWN ARE
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HAMMARLUND

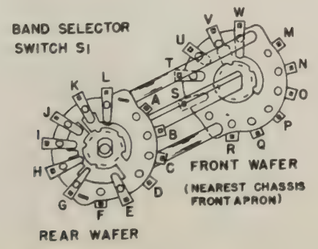
MODEL 5R10A
RUN 4

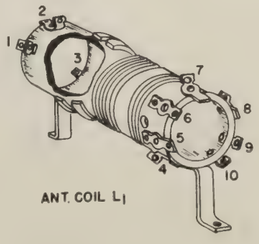


NOTES

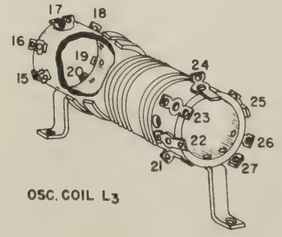
1. RESISTANCE VALUES ARE IN OHMS.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH (S1) SHOWN IN BAND 4 POSITION.
- ELECTRICAL GROUND BUS (B-)
- CHASSIS GROUND

LAST CAPACITOR SYMBOL C-28
LAST RESISTOR SYMBOL R-23

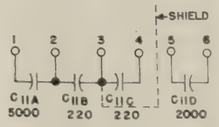












89E379-D

NOTE: VALUES & TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUES OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

Fig. 9. Schematic Diagram

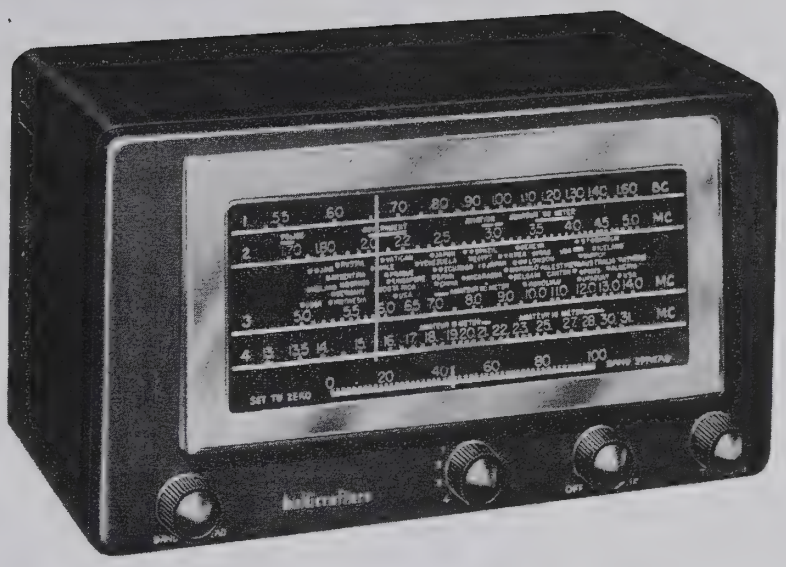


HAMMARLUND

GENERAL DESCRIPTION

Your new Hallicrafters radio offers you world-wide radio reception. It provides continuous coverage from 540 kilocycles to 31 megacycles to bring you standard broadcast programs, foreign and domestic shortwave broadcasts, amateurs, police, ships, aircraft and countless other exciting distant stations. It is a 5 tube superheterodyne radio and will operate on 105 to 125 volt AC or DC current. A 5-inch Alnico V permanent magnet speaker is built into the top of the cabinet and a socket is provided on the back of the set for plugging in a pair of headphones.

Fine performance of both standard and shortwave broadcasts can be obtained in most localities with the 15 foot antenna wire included with your receiver. Simply uncoil this wire, connect one end of it to terminal A1 on the back of the set and then run it about the room in any convenient manner. To complete the antenna installation, connect the jumper between terminal A2 and G.



94X1331-A

Hallicrafters Models 5R10A (Smokey Black) and 5R100A (Hammertone Grey)

Your set is provided with two tuning knobs for greater ease of tuning. Wide tuning is accomplished with the knob marked TUNING and fine tuning with the knob marked BAND SPREAD. The BAND SPREAD knob permits you to accurately tune in stations on crowded bands by spreading them out so that they may be more easily separated. In this way you are able to hear many more stations than you would on an ordinary radio with just one tuning knob.

The principal shortwave stations of the world are clearly marked on the dial for your convenience. Since shortwave conditions vary with the season of the year and even with the time of day, shortwave programs may not be heard with the same regularity as standard broadcasts. To aid you in determining the most favorable times for shortwave listening, a special table is provided on page 3.

To get the maximum enjoyment from your Hallicrafters radio, carefully follow the instructions contained in this book.

INSTALLATION INSTRUCTIONS

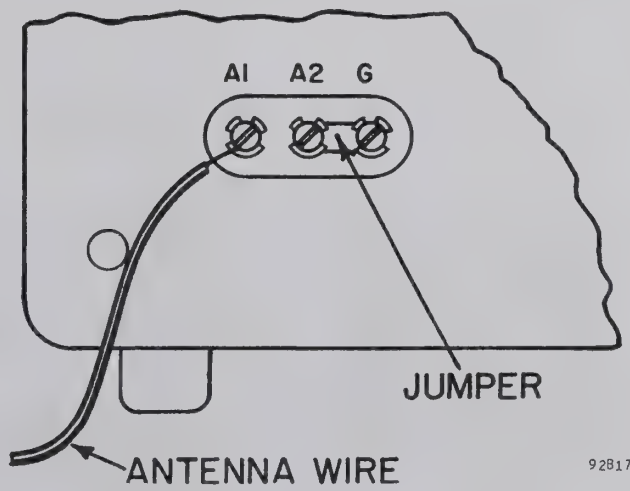
UNPACKING - Check all shipping labels and tags for instructions before removing or destroying them.

POWER SOURCE - The power plug should be inserted into a power outlet that will supply 105 to 125 volt DC or 60 cycle AC current. If in doubt about your power supply, call your power company before plugging in the receiver. The wrong power source may cause serious damage to the receiver.

LOCATION - Do not locate the receiver close to sources of heat such as radiators and heating vents. Allow for proper ventilation of the receiver by placing it at least two or three inches away from the wall.

ANTENNA - The terminals marked A1, A2 and G on the back of the set are for antenna and ground connections. Good results can be obtained in most localities with the 15 foot antenna wire included with your receiver. This wire should be uncoiled to provide maximum signal pickup. An outside antenna 50 to 100 feet long (ordinary copper wire) may be necessary if the receiver is operated in a difficult reception area or steel constructed building. Connect the antenna wire to terminal A1 on the back of the set and then connect the jumper between terminals A2 and G. In some locations, reception may be improved by connecting a lead from terminal G to a cold water pipe or outside ground rod.

For really top performance, there is no substitute for an outside antenna such as used by the commercial radio stations. Provision has been made on your receiver for the connection of this type of antenna, commonly called a doublet. When a doublet antenna is used, the jumper is removed and the antenna is connected to terminals A1 and A2. Consult your radio dealer for further information.



9281776

Fig. 1. Rear View of Receiver Showing Antenna and Ground Terminals

OPERATING INSTRUCTIONS

TUNING DIAL - The top dial scale is the standard broadcast band and is calibrated in kilocycles, minus the last zero. To convert the dial reading to kilocycles, simply add one zero. The shortwave bands, marked 2, 3 and 4, are calibrated directly in megacycles.

BAND SELECTOR CONTROL - Set this control for the band you wish to tune.

VOLUME CONTROL - This control turns the receiver on and off and also controls volume. Turn the knob clockwise to turn the set on and to increase volume. Allow about one minute for the set to warm up.

IMPORTANT - When operating on DC, reverse the power plug if the radio does not operate after the one minute warm up. On DC, the set will operate ONLY with the plug in one position.

TUNING KNOB - Your receiver has been provided with two tuning knobs - The TUNING knob which operates the large pointer at the top of the dial and the BAND SPREAD knob which operates the small pointer at the bottom. The TUNING knob is for wide tuning and the BAND SPREAD knob for fine tuning. To tune the receiver, set the BAND SPREAD dial pointer to zero and then slowly turn the TUNING knob to the desired station. After the station has been accurately tuned in, adjust the VOLUME control for the desired volume.

IMPORTANT - The dial readings will correspond to the exact station frequency only if the BAND SPREAD dial pointer is set at zero.

BAND SPREAD KNOB - The BAND SPREAD knob permits you to accurately tune in stations on crowded bands by spreading them out so that they can be more easily separated. The BAND SPREAD knob can be used in two different ways. First, it may be left with the pointer at 5 while you partially tune in the desired station with the TUNING knob. Then, by "rocking" the BAND SPREAD knob back and forth (turn it a few degrees to the left and right through the desired station), you will be able to tune in the desired station with precision accuracy.

The second way to operate the BAND SPREAD knob is to use it to cover a group of stations. Set the BAND SPREAD knob so that the pointer reads 0 and then turn the TUNING knob to tune in the highest frequency station in the group. The other stations can be heard by slowly turning the BAND SPREAD knob from 0 to 100.

SPEAKER-PHONES SWITCH - Your receiver is equipped with a built-in speaker as well as a socket for connection to headphones. For speaker operation, set the SPEAKER-PHONES switch located on the back of the set at SPEAKER. For headphone operation, set the switch at PHONES. Any 500 to 5000 ohm headphones may be used with the receiver. To connect the headphones, press the headphone pins into the PHONES socket on the back of the set.

BEST SHORTWAVE RECEPTION TABLE

Band	Most Favorable Time	Most Favorable Distance
6-7 MC	Night - Winter	Day- 400 Miles Night - Over 1500 Miles
9-10 MC	Day - Late Afternoon and Night - Winter	Over 500 Miles
11-12 MC	Evenings or Late Summer Afternoons	Day - Under 1500 Miles Night - Over 1500 Miles
15-18 MC	Early Mornings and Summer Evenings	Over 1500 Miles

SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of your receiver, contact your dealer. Make no service shipments to the factory. The Hallicrafters Company maintains an extensive system of authorized factory service centers where any required service can be performed promptly and efficiently at a nominal charge. The sign shown at the right is displayed by all authorized service centers.



The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

92X1401-R

SERVICE INSTRUCTIONS

GENERAL SPECIFICATIONS

Tubes . . . . . 5 including 1 rectifier
Speaker . . . . . 5 inch PM
Voice Coil Impedance . . . . . 3.2 ohms
Headphone Output Impedance . . . 15 ohms
Antenna . . . Terminals for single wire or doublet antenna. (See Page 2.)
Intermediate Frequency . . . . . 455 KC
Frequency Coverage. . . 540 KC - 32 MC
Power Supply. . . . . 105-125 volts DC or 60 cycles AC
Power Consumption . . . . . 30 watts

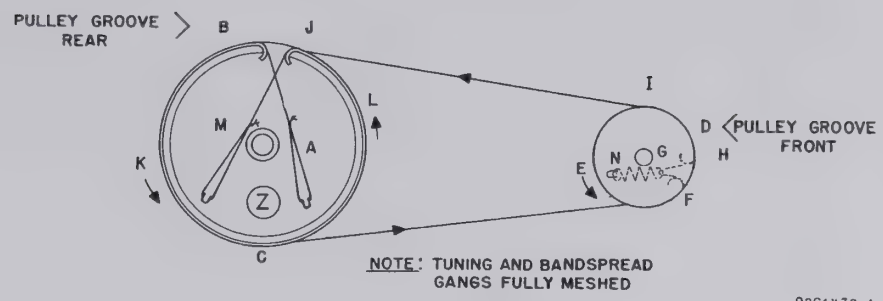


Fig. 2. Main Tuning Gang Drive Stringing Diagram

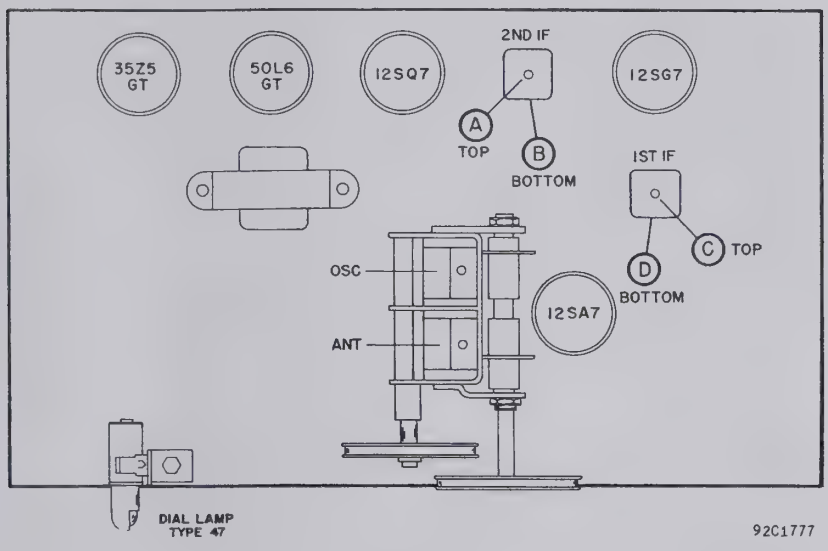


Fig. 3. Top View of Chassis Showing Location of Alignment Adjustments, Tubes and Dial Lamp

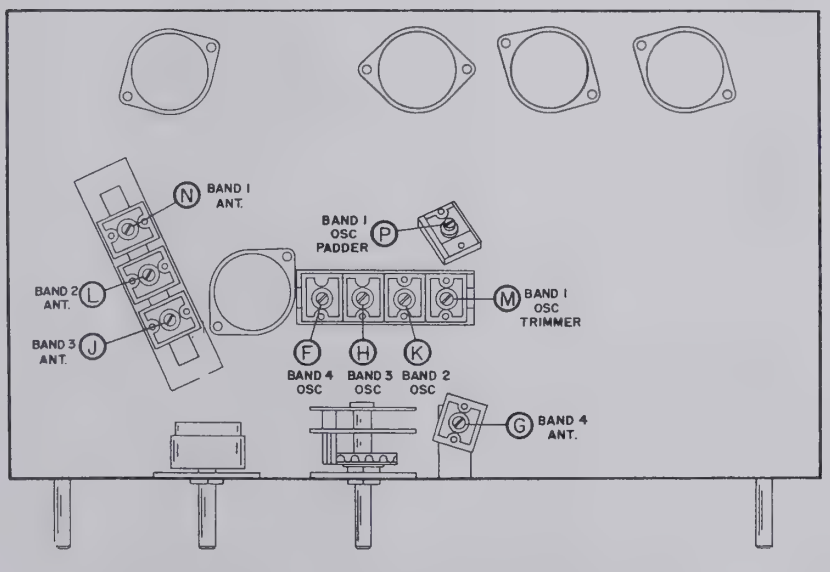


Fig. 4. Bottom View of Chassis Showing Location of Alignment Adjustments

DIAL CORD STRINGING

1. MAIN TUNING GANG DRIVE - Refer to Fig. 2. Tie one end of a 32 inch length of dial cord to the tie point at A on pulley (Z). Follow the stringing procedure A thru F. At G, place the cord thru one end of the tension spring, leaving the other end of the spring disconnected. Then proceed from H thru M. At M, take up the slack in the cord and tie it securely to the tie point. As the final step, stretch the spring and connect it to the tie point at N.

2. MAIN TUNING POINTER DRIVE - Refer to Fig. 5. Tie one end of a 50 inch length of dial cord to the tension spring at A on pulley (X). Follow the procedure A thru M. At M, stretch the spring and tie the cord securely. With the TUNING gang fully meshed, attach the large pointer to the cord and align it with the left hand index mark on band 1.

3. BAND SPREAD GANG & POINTER DRIVE - Refer to Fig. 5. Tie one end of a 41 inch length of dial cord to the tension spring at 1 on pulley (Y). Follow the procedure 1 thru 10. At 10, stretch the spring and tie the cord securely. With the BAND SPREAD gang fully open, attach the small pointer to the cord and align it with 0 on the band spread dial scale.

TUBE AND DIAL LAMP REPLACEMENT - Refer to Fig. 3 for the location of the tubes and dial lamp used in the receiver. To gain access to the tubes and lamp, remove the back cover from the cabinet. Before attempting to make any replacement, set the BAND SPREAD control fully clockwise and the TUNING control fully counterclockwise to prevent damage to the tuning gang. To replace a tube, insert the center guide pin into the center hole of the tube socket, rotate the tube until the key drops into position and then push down until the tube is held firmly in the socket. To make a dial lamp replacement, unclip the dial lamp socket from the mounting clip. Make replacement only with a type 47 pilot lamp.

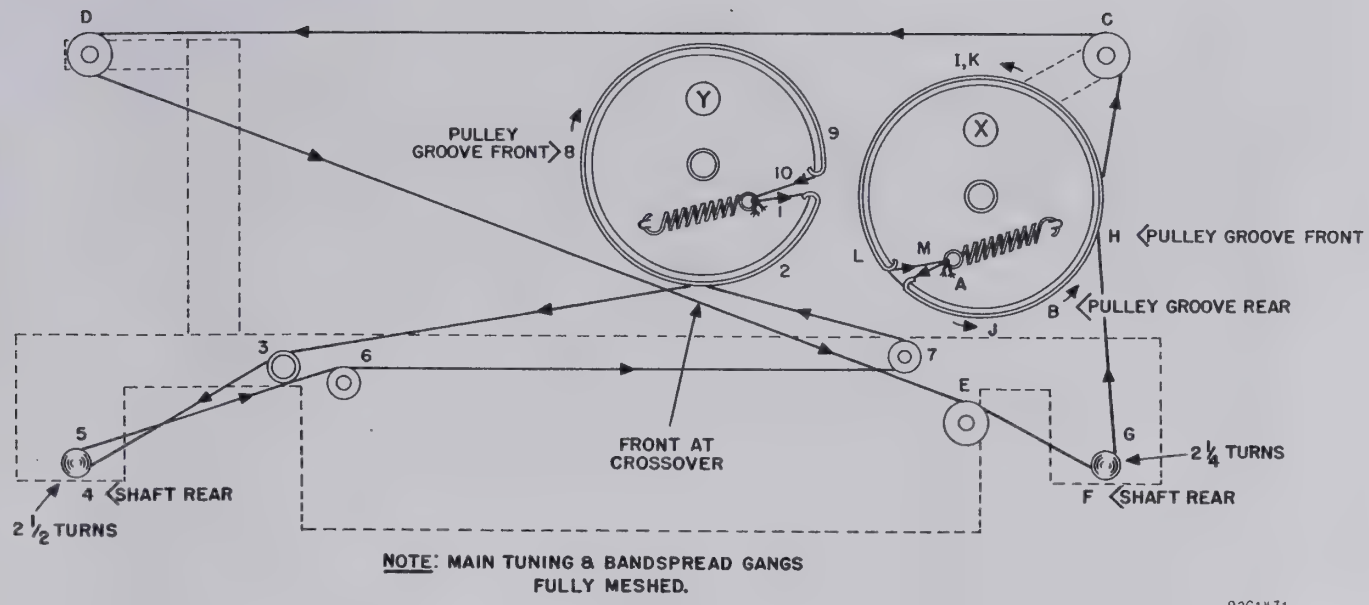


Fig. 5. Main Tuning Pointer Drive and Band Spread Gang and Pointer Drive Stringing Diagrams

ALIGNMENT INSTRUCTIONS

- Use an amplitude modulated generator covering 455 KC to 30 MC.
- Connect output meter across speaker voice coil.
- Use a non-metallic alignment tool.
- Set the SPEAKER/PHONES switch at SPEAKER, VOLUME control at maximum, and the BAND SPREAD control at 0.
- See Figs. 3 and 4 for location of alignment adjustments.

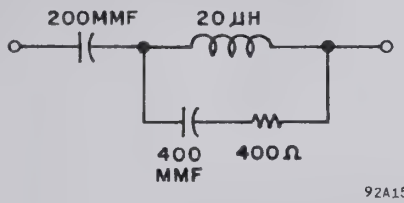
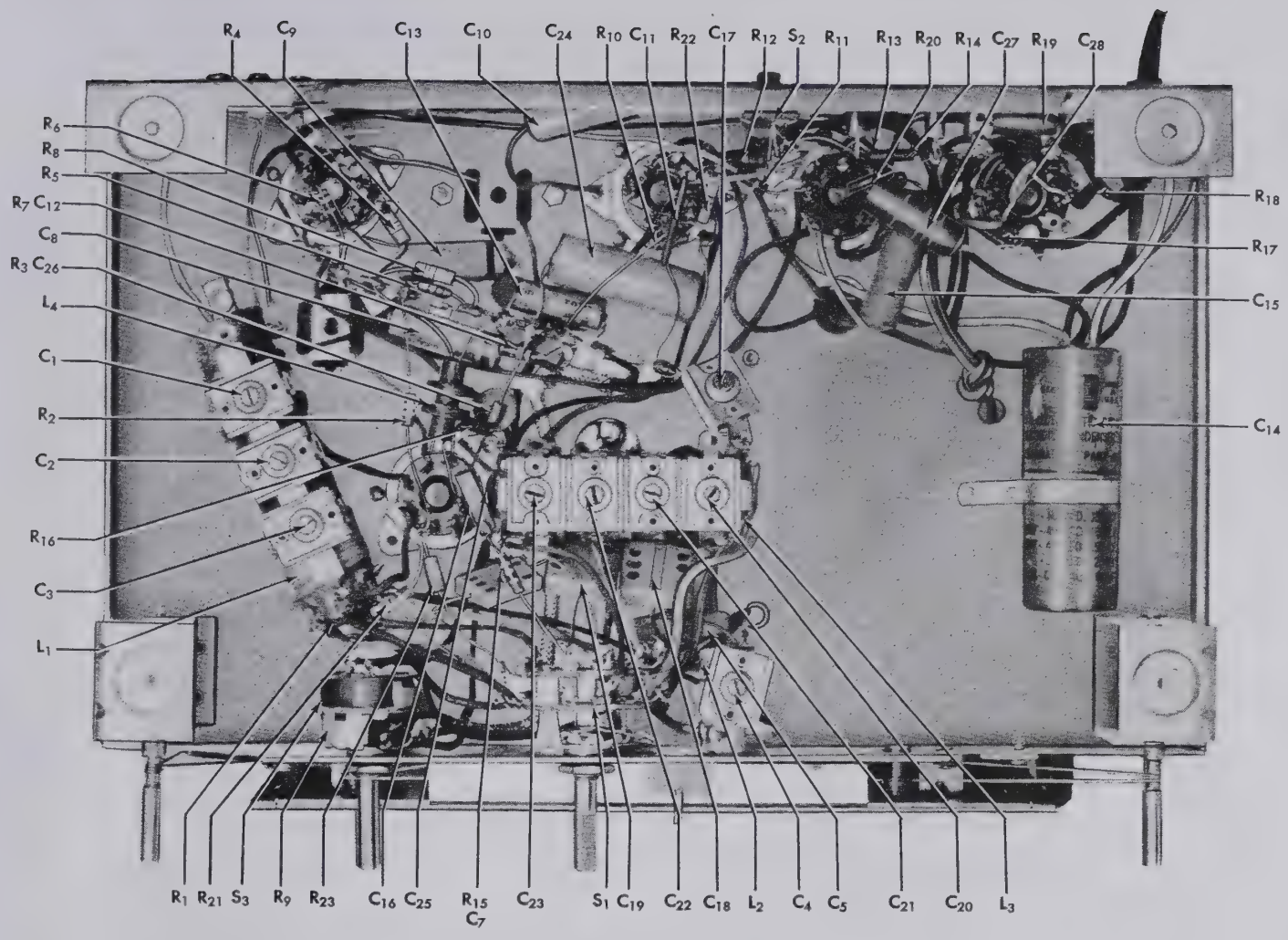


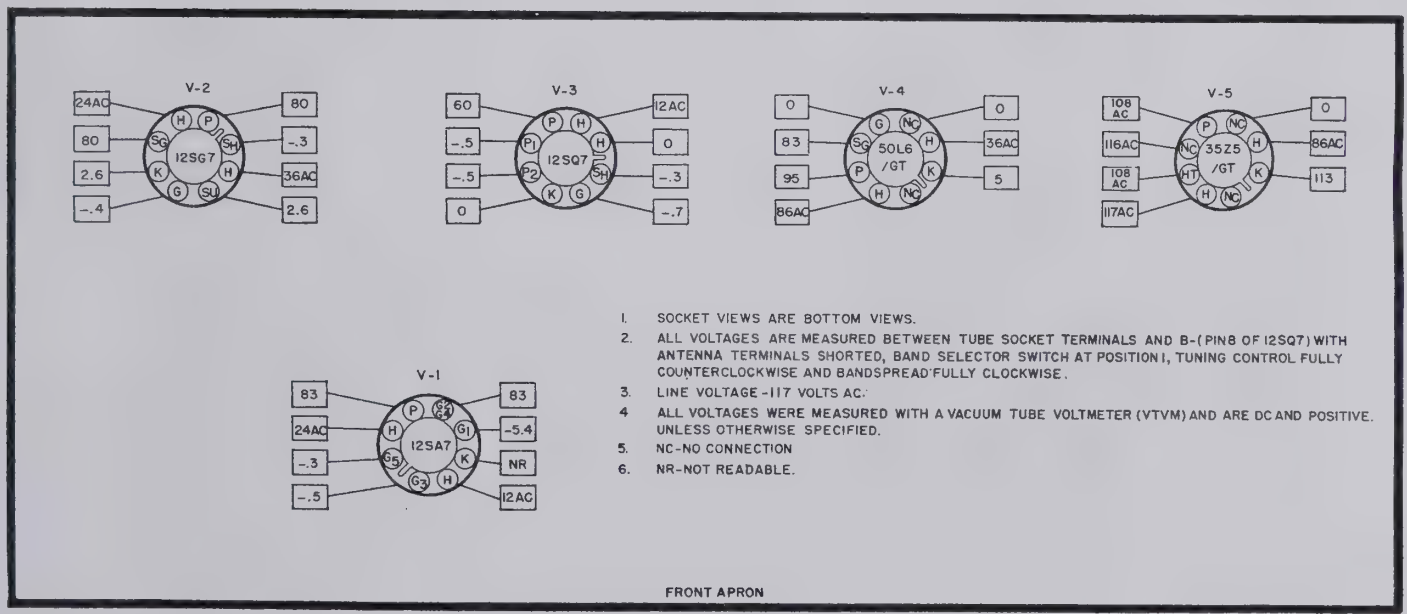
Fig. 6. RMA Dummy Antenna

Step	Signal Generator Connections	Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust
		IF ALIGNMENT			
1	High side thru a .01 mfd. capacitor to stator plates of front section of TUNING gang. Low side to chassis.	455 KC	1	1000 KC	A, B, C and D for maximum output. Keep reducing gen. output so that the reading on the output meter does not exceed 50 milliwatts.
		RF ALIGNMENT			
2	High side thru RMA dummy antenna (Fig. 6) to terminal A1 on back of chassis. Low side to chassis. Connect jumper between A2 and G.	30 MC	4	30 MC	F and G for maximum output as in Step 1.
3	Same as Step 2.	14 MC	3	14 MC	H and J for maximum output as in Step 1.
4	Same as Step 2.	5 MC	2	5 MC	K and L for maximum output as in Step 1.
5	Same as Step 2.	1500 KC	1	1500 KC	M and N for maximum output as in Step 1.
		600 KC	1	600 KC	P for maximum output as in Step 1.



92X1463-A

Fig. 7. Bottom View of Chassis Showing Component Location



1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND B-(PIN8 OF 12SQ7) WITH ANTENNA TERMINALS SHORTED, BAND SELECTOR SWITCH AT POSITION 1, TUNING CONTROL FULLY COUNTERCLOCKWISE AND BANDSPREAD FULLY CLOCKWISE.
3. LINE VOLTAGE -117 VOLTS AC.
4. ALL VOLTAGES WERE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM) AND ARE DC AND POSITIVE. UNLESS OTHERWISE SPECIFIED.
5. NC-NO CONNECTION
6. NR-NOT READABLE.

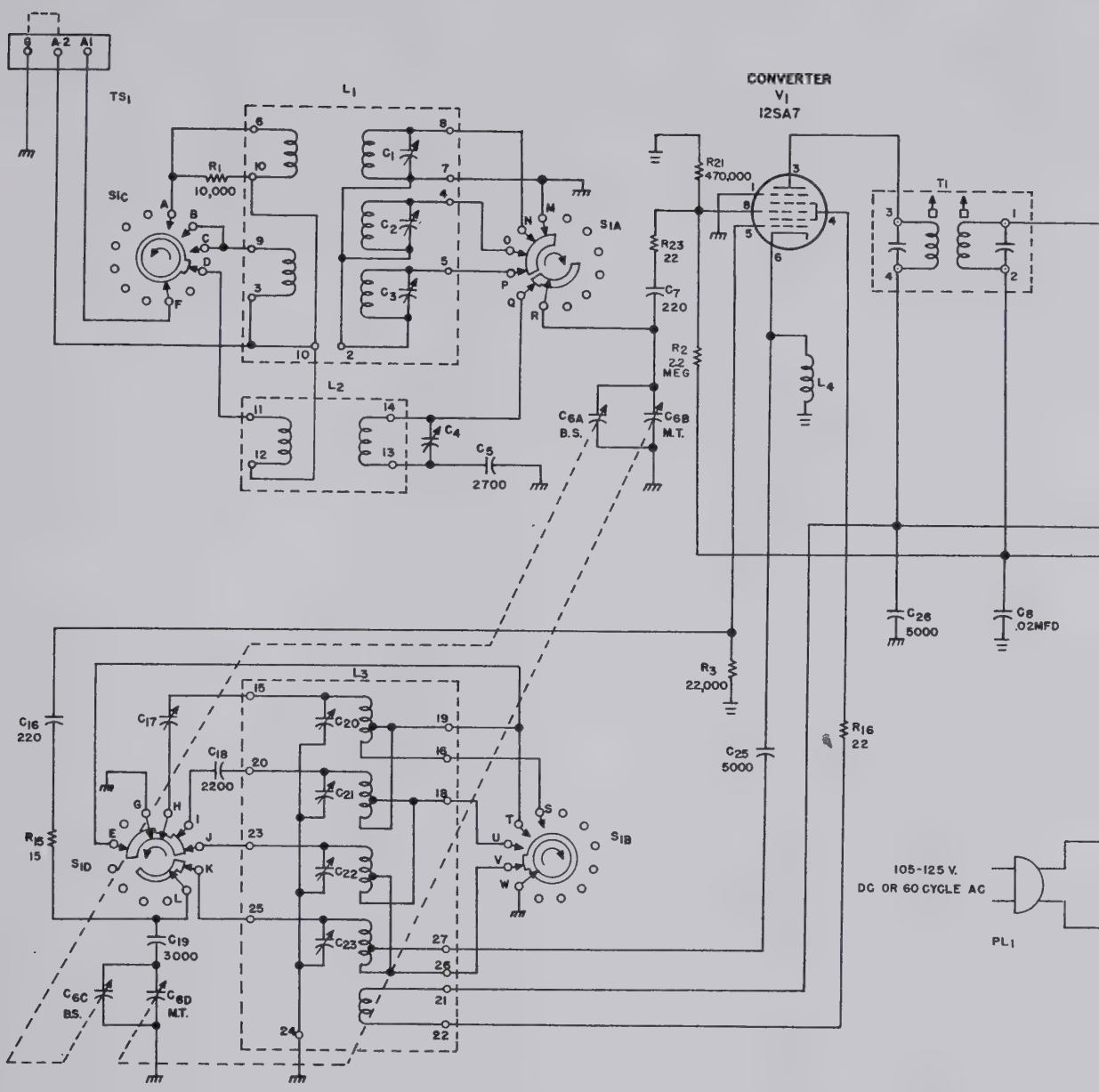
Fig. 8. Tube Socket Voltage Chart

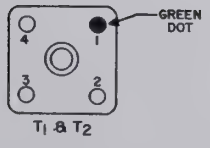
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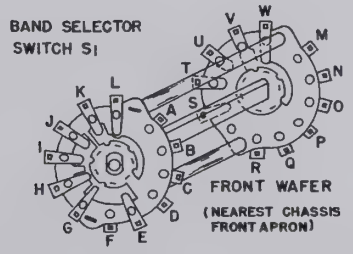
SERVICE PARTS LIST

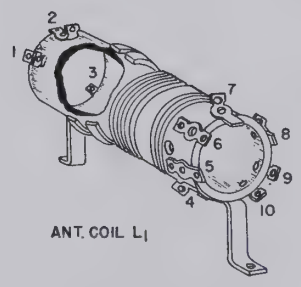
Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3	Trimmer, adjustable (part of antenna coil L-1)	- - - - - -
C-4	Trimmer, adjustable; 20-120 mmf.	44A424
C-5	2700 mmf. 5%, 500 V.; mica	47X30B272J
C-6A,B, C,D	Tuning capacitor; 2 gang	48-269
C-7,12,16	220 mmf. 10%, 500 V.; mica	47X20B221K
C-8,15	.02 mfd. 600 V., tubular paper	46AY203J
C-9	.05 mfd. 200 V., tubular paper	46AU503J
C-10	.002 mfd. 600 V., tubular paper	46AZ202F
C-11A,B, C,D	Capacitor, composite: 5000, dual 220 and 2000 mmf. 500 V.; ceramic	46A151
C-13	.01 mfd. 600 V., tubular paper	46AZ103J
C-14A,B, C,D,	60-40-40 mfd. 150 V., 20 mfd. 25 V., electrolytic	45B091
C-17	Padder, adjustable; 525 mmf.	44A349
C-18	2200 mmf. 5%, 500 V.; mica	47X30B222J
C-19	3000 mmf. 5%, 500 V.; mica	47X30B302J
C-20,21, 22,23	Trimmer, adjustable (part of oscillator coil L-3)	- - - - - -
C-24	.05 mfd. 600 V., tubular paper	46AY503J
C-25,26	5000 mmf. 450 V., ceramic disc	47A168
C-27	.02 mfd. 600 V., molded tubular paper	46BR203L6
C-28	.01 mfd. 450 V., ceramic disc	47A217
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103M
R-2,5	2.2 megohms 1/2 watt, carbon	23X20X225M
R-3	22,000 ohms 1/2 watt, carbon	23X20X223M
R-4	270 ohms 1/2 watt, carbon	23X20X271K
R-6	330 ohms 1/2 watt, carbon	23X20X331M
R-7	47,000 ohms 1/2 watt, carbon	23X20X473M
R-8,12, 21,22	470,000 ohms 1/2 watt, carbon	23X20X474M
R-9	2 megohms; VOLUME control	25B896
R-10	10 megohms 1/2 watt, carbon	23X20X106M
R-11	220,000 ohms 1/2 watt, carbon	23X20X224M
R-13	150 ohms 1/2 watt, carbon	23X20X151K
R-14,15, 17	15 ohms 1/2 watt, carbon	23X20X150M
R-16,18, 23	22 ohms 1/2 watt, carbon	23X20X220M
R-19	220 ohms 1 watt, carbon	23X30X221M
R-20	1000 ohms 1/2 watt, carbon	23X20X102M
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; bands 1, 2 and 3	51C821
L-2	Coil, antenna; band 4	51B1015
L-3	Coil, oscillator; all bands	51C822
L-4	Choke, RF	53A107
T-1	Transformer, 1st IF	50C531
T-2	Transformer, 2nd IF	50C532
T-3	Transformer, audio output	55A127

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1A,B, C,D	Bandswitch assembly; BAND SELECTOR	60C393
S-2	Switch, spdt; SPEAKER/ PHONES	60A243
S-3	Switch, power; spst (part of VOLUME control R-9)	- - - - - -
	SOCKETS AND CONNECTORS	
TS-1	Terminal strip, antenna	88A671
TS-2	Jack, PHONES	88A071
	Socket, dial lamp; with leads	86A122
	Socket, octal; tube	6A250
	TUBES AND DIAL LAMPS	
V-1	12SA7: converter	90X12SA7
V-2	12SG7: IF amplifier	90X12SG7
V-3	12SQ7: detector and audio amplifier	90X12SQ7
V-4	50L6GT: audio output	90X50L6GT
V-5	35Z5GT: rectifier	90X35Z5GT
LM-1	Lamp, dial; Mazda #47	39A004
	MISCELLANEOUS PARTS	
	Cabinet, model 5R10A (smokey black)	66B702
	Cabinet, model 5R100A (hammertone grey)	66C915
	Cabinet back	32C500
	Channel, rubber (for escutcheon glass)	16A212
	Clip, dial mtg.	76A646
	Clip mtg. (for antenna coil L-2)	76A326
	Cover, cabinet bottom	32C501
	Dial background	32B488
	Dial cord (specify length)	38A026
	Dial scale	22B318
	Escutcheon	7C248
	Foot, mounting; rubber	16A244
	Glass, escutcheon	22B319
	Grommet, rubber	16A015
	Knob, BAND SELECTOR	15B323
	Knob, BANDSPREAD, OFF-VOLUME and TUNING	15B322
PL-1	Line cord and plug	87A078
	Line cord lock	76A397
	Pointer, dial; bandspread tuning	82A198
	Pointer, dial; main tuning	82A199
	Shield, dial lamp	8A1249
LS-1	Speaker, PM; 5 inch	85C030
	Spring, dial drive; 17/32"	75A012
	Spring, dial drive; 3/8"	75A173





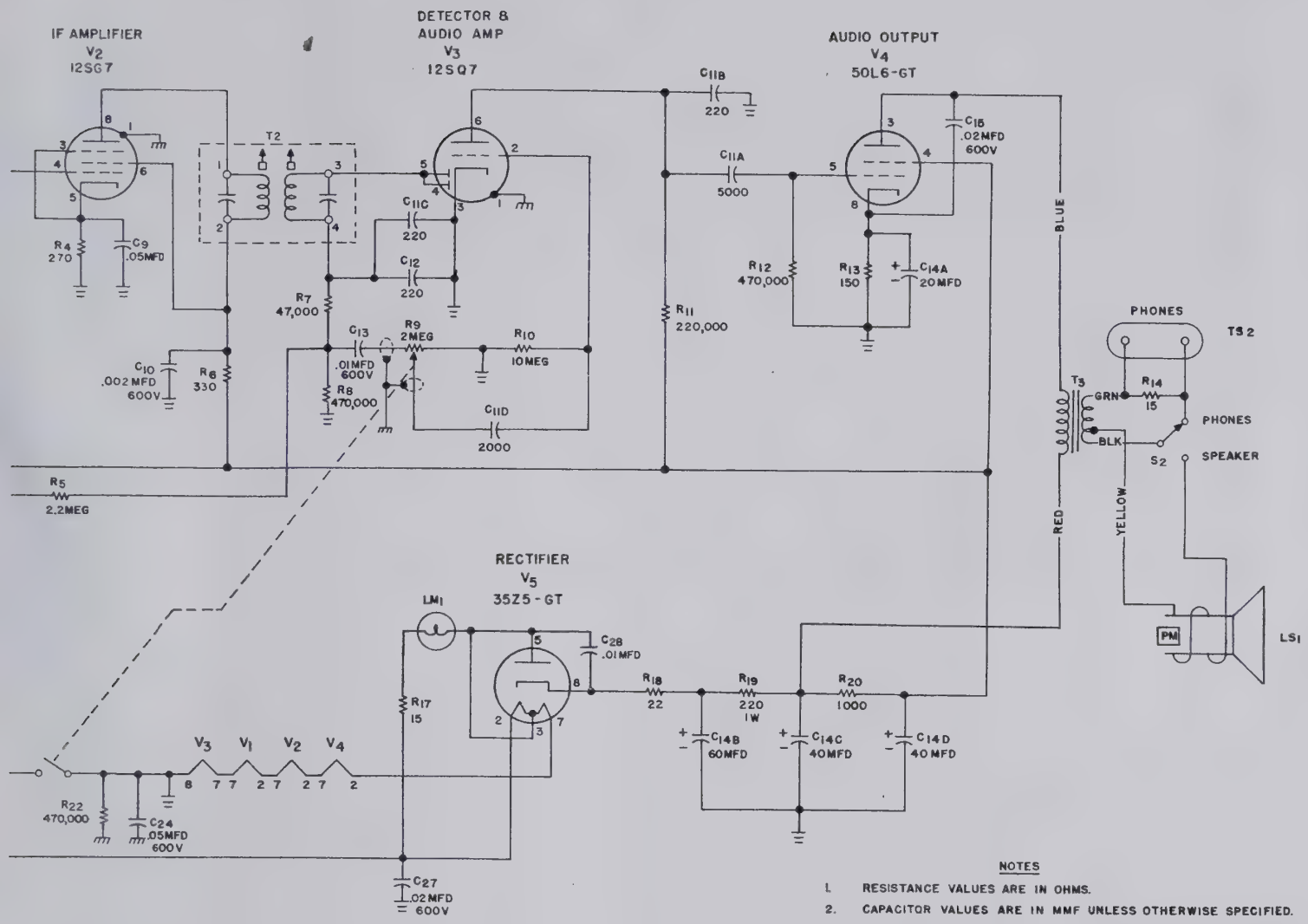




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MODELS 5R10A and 5R100A

RUN 4



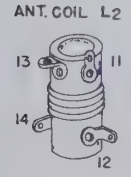
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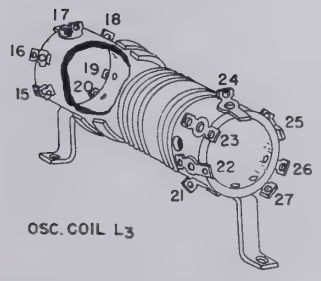
1. RESISTANCE VALUES ARE IN OHMS.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH (S_1) SHOWN IN BAND 4 POSITION.

⏚ ELECTRICAL GROUND BUS (B-)

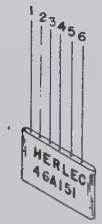
⏥ CHASSIS GROUND

LAST CAPACITOR SYMBOL C-28
LAST RESISTOR SYMBOL R-23

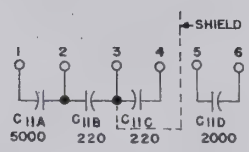




OSC. COIL L3



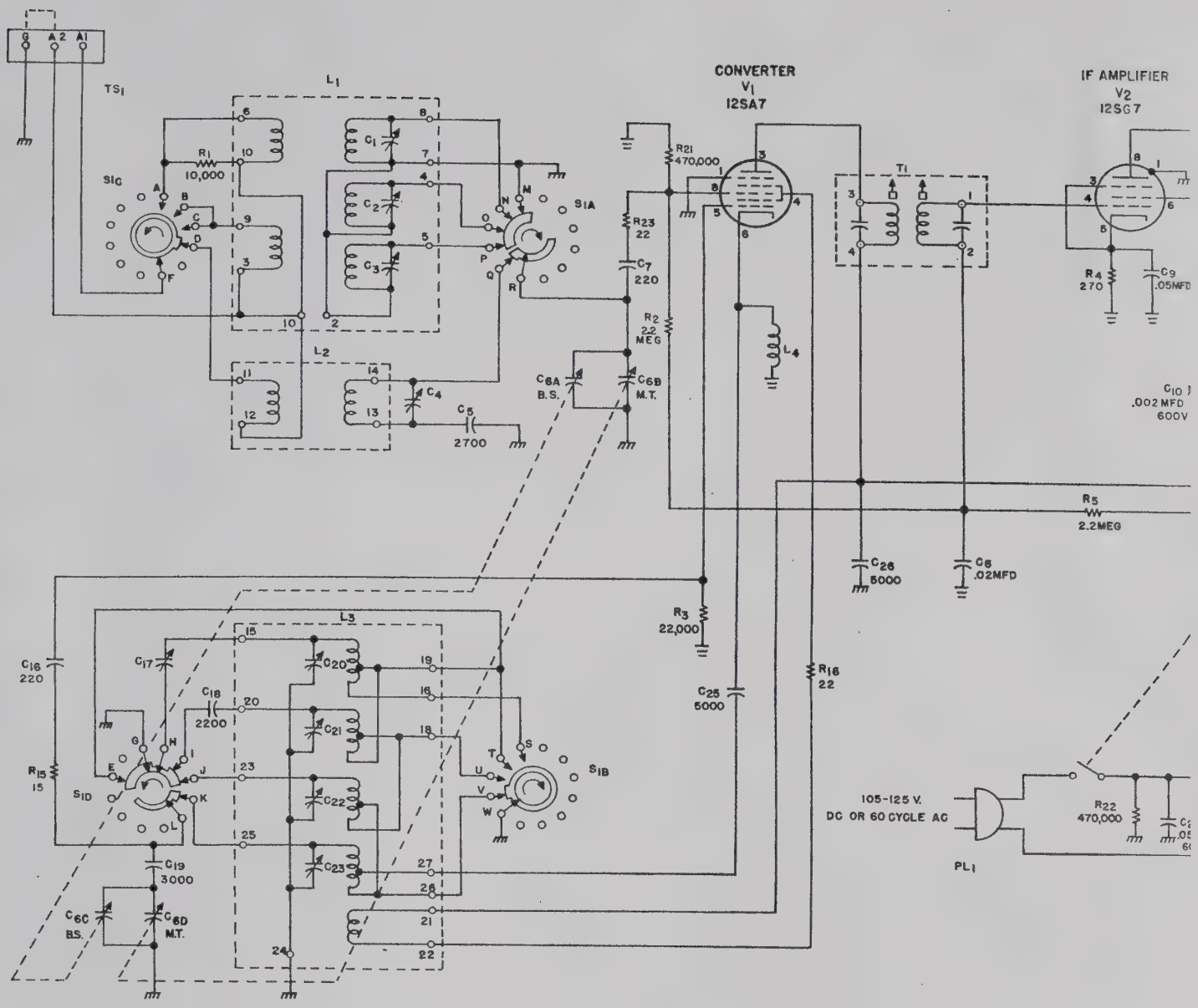
CAPACITOR C_{11}

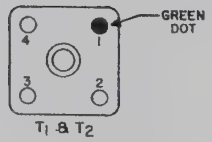


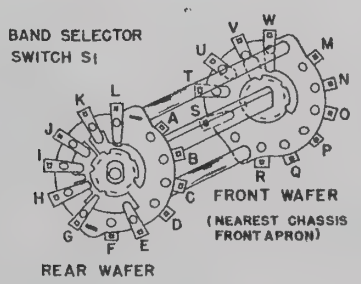
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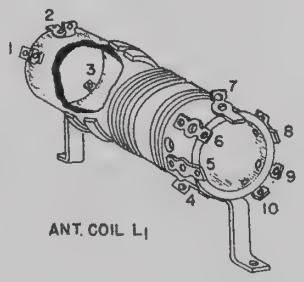
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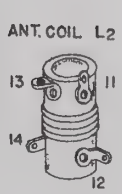
Fig. 9. Schematic Diagram



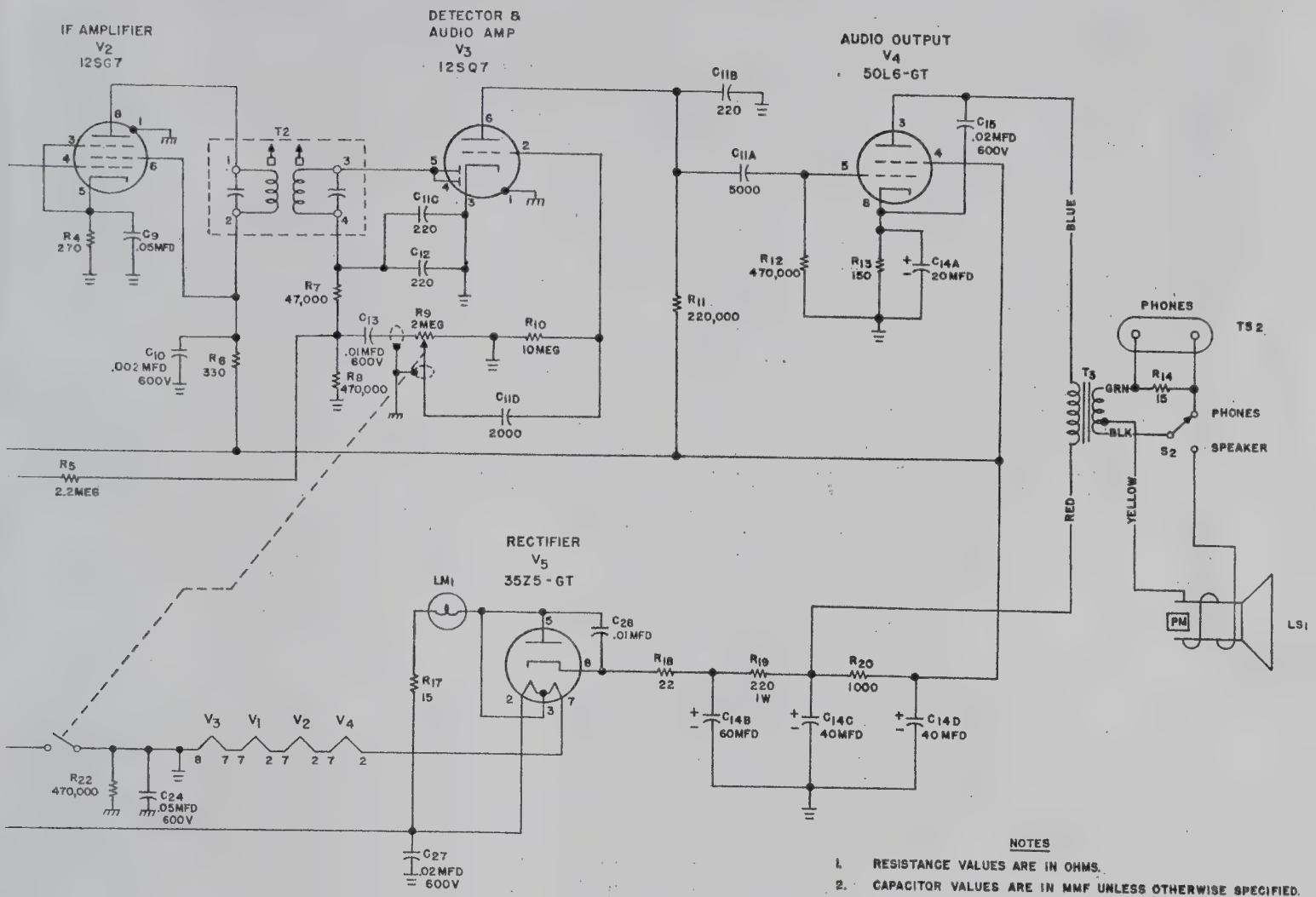








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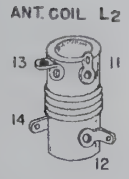
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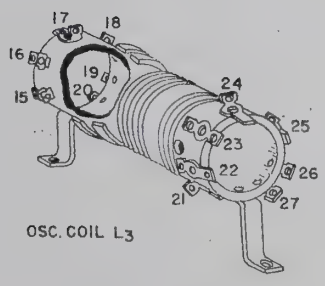
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4. BAND SELECTOR SWITCH (S_1) SHOWN IN BAND 4 POSITION.

⏚ ELECTRICAL GROUND BUS (B-)

⏚ CHASSIS GROUND

LAST CAPACITOR SYMBOL C-28
LAST RESISTOR SYMBOL R-23

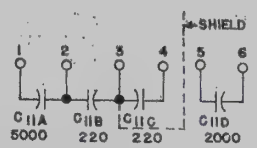




OSC. COIL L3



CAPACITOR C11



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Fig. 9. Schematic Diagram

8R40 RADIO
and
8R40C RADIO-PHONOGRAPH COMBINATION

OPERATING and SERVICE INSTRUCTIONS

8R40 and 8R40C
RUN 1

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

This new Hallicrafters radio offers the finest in world-wide radio reception. It features continuous tuning from 540 kilocycles to 44 megacycles for outstanding reception of standard broadcast programs, police, foreign and domestic shortwave broadcasts, amateurs, aircraft, ships and many other exciting distant stations. It receives both voice and code broadcasts and is equipped with a phono socket for playing records through the set. The console model, the 8R40C, has a built-in record changer which automatically plays 7", 10" and 12" records at all three speeds - 78, 45 and 33-1/3 r.p.m.



92X1652

HALLICRAFTERS MODEL 8R40

Good reception is usually possible without an outside antenna or ground and in most localities, fine performance of both standard and shortwave broadcasts can be obtained with the 15 foot antenna wire included with your receiver. It is merely necessary to uncoil this wire, connect one end of it to terminal A1 on the back of the set and then run it about the room in any convenient manner. To complete the antenna installation, connect the jumper between terminals A2 and G on the back of the set.

Your set is provided with two tuning knobs for greater east of tuning. Wide tuning is done with the knob marked TUNING and fine tuning with the knob marked BANDSPREAD. The BANDSPREAD knob permits you to accurately tune in stations on crowded bands by spreading them out so that they may be more easily separated. In this way you are able to hear more stations than you would on ordinary radios with just one tuning knob.

The principal shortwave stations of the world are clearly marked on the dial for your convenience. Since shortwave conditions vary with the season of the year and even with the time of day, shortwave programs may not be heard with the same regularity as standard broadcasts. To determine the most favorable times for shortwave listening, refer to the table provided below.

An Alnico V permanent magnet speaker and full range tone control assure lifelike reproduction of your favorite radio broadcasts and records. If you wish to use an external speaker instead of the one mounted in the cabinet, terminals on the back of the set permit the built-in speaker to be disconnected and an external speaker connected in its place. A jack is provided on the front panel for plugging in a pair of headphones. When the phones are inserted the speaker is automatically disconnected.

A special feature not found in ordinary radios is the SENSITIVITY control on the front panel which permits you to adjust the radio for the strength of each individual station. You will notice when operating the set that the SENSITIVITY control does not have to be turned to maximum for normal reception. This means that you have extra sensitivity available to enable you to pull in weak, distant stations.

The information which follows will assure you greater enjoyment of your Hallicrafters radio. Read it carefully before operating the receiver.

BEST SHORTWAVE RECEPTION TABLE

Band	Most Favorable Time	Most Favorable Distance
6-7 MC	Night - Winter	Day - 400 Miles Night - Over 1500 Miles
9-10 MC	Day - Late Afternoon and Night - Winter	Over 500 Miles
11-12 MC	Evenings or Late Summer Afternoons	Day - Under 1500 Miles Night - Over 1500 Miles
15-18 MC	Early Mornings and Summer Evenings	Over 1500 Miles

INSTALLATION INSTRUCTIONS

POWER SOURCE - This radio is designed to operate from 105 to 130 volt 50/60 cycle alternating current (AC). Do not connect your radio to a wall outlet until certain that the power source is correct for the receiver. If in doubt, telephone your local power company before inserting the plug.

SPEAKER CONNECTION - A built-in speaker has been provided with your receiver, however, a separate external speaker may easily be connected if desired. Terminals marked 1, 2 and 3 are provided on the back of the set for speaker connections. To use the built-in speaker on Model 8R40, simply connect the jumper between 2 and 3. To use an external speaker with Model 8R40, remove the jumper and connect the speaker to 1 and 2. On Model 8R40C, connect either an external speaker or the two leads from the built-in speaker to terminals 1 and 2.

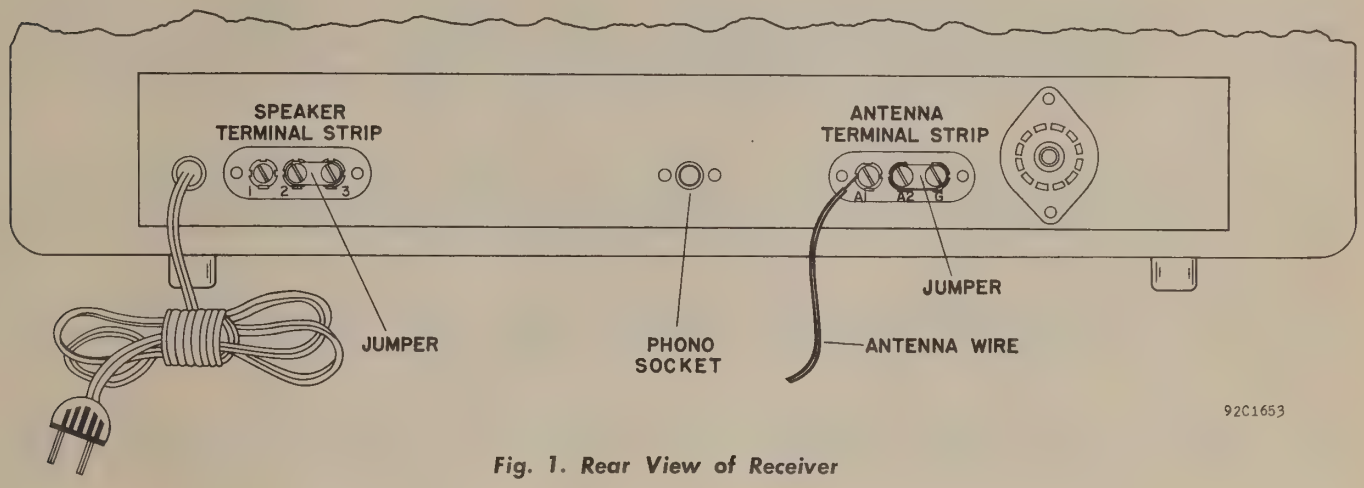


Fig. 1. Rear View of Receiver

ANTENNAS - The terminals marked A1, A2 and G on the back of the set are for antenna and ground connections. Satisfactory reception can be obtained in most localities with merely the 15 foot antenna wire included with your set. The wire should be uncoiled to provide maximum signal pickup. An outside antenna 30 to 60 feet long (ordinary copper wire) may be necessary if the receiver is operated in a difficult reception area or steel constructed building. Connect the antenna to A1 and then connect the jumper between A2 and G. In some locations, reception may be improved by connecting a lead from terminal G to a cold water pipe or other good ground.

For really top performance, there is no substitute for an outside antenna such as used by the commercial radio stations. Provision has been made on your receiver for the connection of this type of antenna, commonly called a doublet. When a doublet antenna is used, the jumper is removed and the antenna is connected to terminals A1 and A2. Consult your radio dealer for further information.

OPERATING INSTRUCTIONS

Each control of this radio receiver performs a definite function which contributes to its outstanding reception capabilities. Full appreciation of your receiver is to be expected only after you have become familiar with each of the controls and the effect their operation has on the performance of the receiver.

SENSITIVITY CONTROL - Use this control in conjunction with the VOLUME control to regulate the volume. The setting of the SENSITIVITY control determines the ability of the radio to pick up weak distant stations. Normally this control should be set fully clockwise for maximum signal pickup. In some instances, however, the signal may be too strong with the control set at maximum and as a result it may sound distorted. When this occurs, reduce the sensitivity of the radio slightly by turning the SENSITIVITY control counterclockwise. If, after decreasing the sensitivity, you need more volume use the VOLUME control.

BAND SELECTOR CONTROL- Set this control for the band that you wish to tune. The band numbers corresponding to the settings of this control are on the right and left sides of the dial.

VOLUME CONTROL - Turn this control clockwise to turn the set on. Allow about 30 seconds for the tubes to reach operating temperature and then advance the control to increase volume. To turn the set off, turn the control counterclockwise until a click is heard.

OPERATING INSTRUCTIONS (Cont.)

TUNING KNOB - Your receiver has been provided with two tuning knobs - the TUNING knob which operates the large pointer at the top of the dial and a separate BANDSPREAD knob which operates the small pointer at the bottom. The TUNING knob is for wide tuning and the BANDSPREAD knob for fine tuning. Use the TUNING knob to tune in the desired station after you have set the BAND SELECTOR control for the proper band. Tune for the clearest and strongest signal. If the signal is too strong reduce it by means of the VOLUME control, not by using the TUNING knob.

IMPORTANT - The dial readings will correspond to the exact station frequencies only if the BANDSPREAD knob is set so that the small dial pointer reads 0.

BAND SPREAD KNOB - The BANDSPREAD knob permits you to accurately tune in stations on crowded bands by spreading them out so that they can be more easily separated. The BANDSPREAD knob can be used in two different ways. First, it may be left with the small pointer at 5 while you partially tune in the desired station with the TUNING knob. Then, by "rocking" the BANDSPREAD knob back and forth (turn it a few degrees to the left and right through the desired station), you will be able to tune in the desired station with precision accuracy.

The second way to operate the BANDSPREAD knob is to use it to cover a group of stations. Set the BANDSPREAD knob so that the small pointer reads 0 and then turn the TUNING knob to tune in the highest frequency station in the group. The other stations can be heard by slowly turning the BANDSPREAD knob from 0 to 100.

CW-TONE CONTROL - This is a combination CW (code) on-off switch and 3 position tone control. When listening to voice and musical broadcasts or records the control should be set at HIGH, MEDIUM or LOW for the tone most pleasing to the listener. Set this control at CW only if you wish to hear code signals.

PITCH CONTROL KNOB - Use this knob to vary the pitch of CW code signals when listening to amateur or commercial code stations. The CW-TONE control on the front panel must be set at CW for this control to have any effect.

PHONO-RADIO KNOB- Set this knob to radio for reception of radio broadcasts or to PHONO if you wish to play records through the radio.

RECORD PLAYER OPERATION - A phono jack is provided on the back of the set for plugging in a record player. After connecting the player, turn the PHONO-RADIO knob to the PHONO position. Use the VOLUME and CW-TONE controls in the same manner as for radio reception. The remaining controls do not affect record player operation.

SERVICE INSTRUCTIONS

GENERAL SPECIFICATIONS

Tubes and Rectifiers	7 tubes plus 2 selenium rectifiers
Speaker	
Model 8R40	5-inch PM
Model 8R40C	8-inch PM
Voice Coil Impedance	3.2 ohms
Antenna Provisions	Terminals for single wire or doublet antenna. (See page 3.)
Intermediate Frequency	455 KC
Frequency Coverage	540 KC - 44 MC
Power Supply	105-130 volts 50/60 cycles AC
Power Consumption	
Model 8R40	75 watts
Model 8R40C	100 watts with record changer

TUBE AND DIAL LAMP REPLACEMENT - Refer to Fig. 4 for the location of the tubes and dial lamps used in the receiver. The hinged top cover must be raised on Model 8R40 to gain access to the tubes and dial lamps. When replacing tubes, check the tube type carefully and replace it with the correct type. To replace a tube, insert the center guide pin into the center hole of the tube socket, rotate the tube until the key drops into position and then push down until it is held firmly in the socket. To make a dial lamp replacement, unclip the dial lamp socket from the mounting bracket. Replace the defective lamp with a type 44 pilot lamp.

SERVICING RECORD CHANGER - Complete service information for the automatic record changer is given in a separate service manual, Hallicrafters Part No. 94X906.

DIAL CORD STRINGING - The dial drive system of this receiver consists of three separate string drives: (1) TUNING gang drive (2) TUNING pointer drive and (3) BANDSPREAD gang and pointer drive. All stringing should be done with the TUNING and BANDSPREAD gangs fully meshed.

TUNING GANG DRIVE - Tie one end of a 34 inch length of 30 lb. test dial cord to the tie point at position A on pulley (W). Follow the stringing procedure A through E. At position F, place the dial cord through one end of the tension spring. Leave the other end of the spring disconnected and follow the stringing procedure G through K. At position K, take up the slack in the cord and tie it securely to the tie point. As the final step, stretch the tension spring and connect it to the tie point at position L on pulley (X).

TUNING POINTER DRIVE - Tie one end of a 42 inch length of 30 lb. test dial cord to the spring at position 1 on pulley (Z). Follow the stringing procedure 1 through 9. At position 9, stretch the spring and tie the cord securely to the spring. Note that 2-1/4 turns of cord are wrapped around the TUNING drive shaft for proper traction. With the TUNING gang fully meshed, attach the dial pointer to the cord and align it with the left hand index marks on the dial. Cement the pointer to the cord with a drop of quick drying cement.

BANDSPREAD GANG AND POINTER DRIVE - Tie one end of a 41 inch length of 30 lb. test dial cord to the spring at position 1 on pulley (Y). Follow the stringing procedure 1 through 8. At position 8, stretch the spring and tie the cord securely to the spring. Note that 2-1/4 turns of cord are wrapped around the BANDSPREAD drive shaft for proper traction. With the BANDSPREAD gang fully open, attach the dial pointer to the cord and align it with 0 on the BANDSPREAD dial. Cement the pointer to the cord with a drop of quick drying cement.

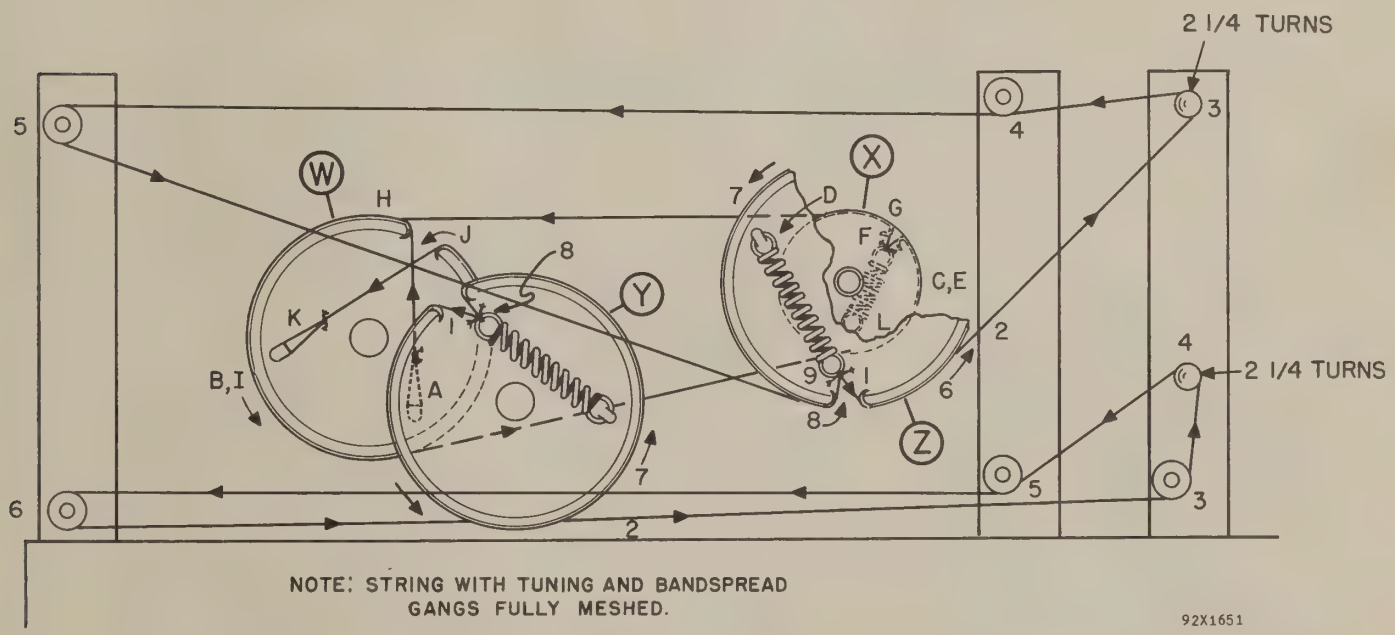


Fig. 2. Dial Cord Stringing Diagram

SERVICE OR OPERATING QUESTIONS - For further operation regarding information or servicing of your radio, contact your dealer. Make no service shipments to the factory as the Hallicrafters Co. will not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER which displays the sign shown at the right of the page. For the location of the one nearest you, consult your dealer or telephone directory.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



92X1401-R

ALIGNMENT INSTRUCTIONS

- Be sure both the set and signal generator are thoroughly warmed up before starting alignment.
- Use an amplitude modulated generator covering 455 KC to 36 MC. Use a modulated output for every step except Step 2.
- Connect an output meter across the speaker voice coil.
- Use a non-metallic alignment tool.
- Set the VOLUME, SENSITIVITY and BANDSPREAD controls fully clockwise, CW-TONE control at HIGH and the PHONO-RADIO knob at RADIO.
- Refer to Figs. 4 and 5 for location of alignment adjustments.

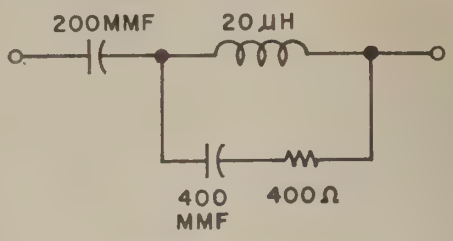


Fig. 3. RMA Dummy Antenna

Step	Signal Generator Connections	Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust
		IF ALIGNMENT			
1	High side to stator plates of center section of TUNING gang. Low side to chassis.	455 KC	1	1000 KC	A, B, C, D, E and F for max. output. Keep reducing gen. output so that the output meter reading does not exceed 50 milliwatts.
		CW PITCH CONTROL ADJUSTMENT			
2	Same as Step 1.	455 KC (No Mod.)	1	1000 KC	Set the CW-TONE control to CW. Remove the PITCH CONTROL knob and adjust G for a zero beat. Replace the knob with the dot in the top center position. After completing Step 2, reset the CW-TONE control to HIGH.
		RF ALIGNMENT			
3	High side thru RMA dummy antenna (Fig. 3) to terminal A1 on back of chassis. Low side to chassis. Connect the jumper between A2 and G.	36 MC	4	36 MC	H, I and J for maximum output as in Step 1.
		18 MC	4	18 MC	K, L and M for maximum output as in step 1.
4	Same as Step 3.	14 MC	3	14 MC	N, O and P for maximum output as in Step 1.
		10 MC	3	10 MC	Q, R, and S for maximum output as in Step 1.
5	Same as Step 3.	5 MC	2	5 MC	T, U and V for maximum output as in Step 1.
		1.8 MC	2	1.8 MC	W for maximum output as in Step 1.
6	Same as Step 3.	1500 KC	1	1500 KC	X, Y and Z for maximum output as in Step 1.
		600 KC	1	600 KC	Z" for maximum output as in Step 1.

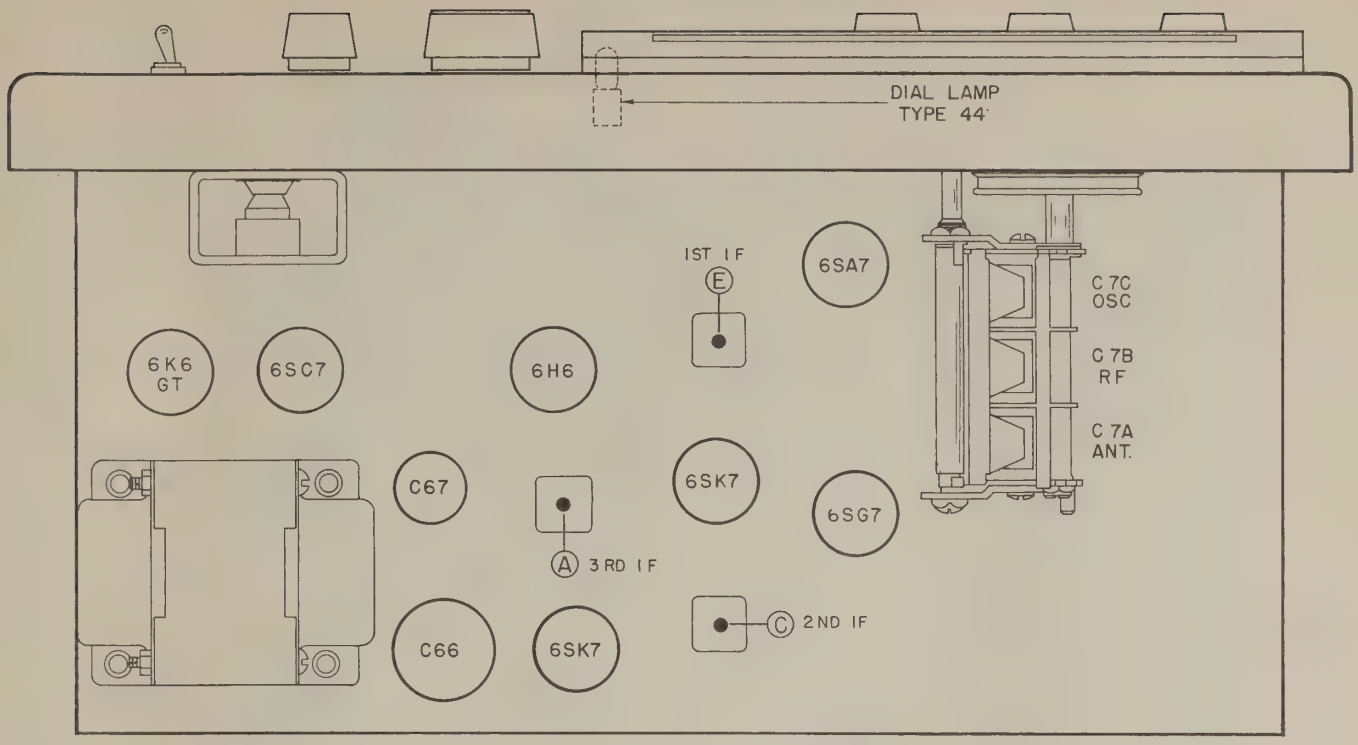
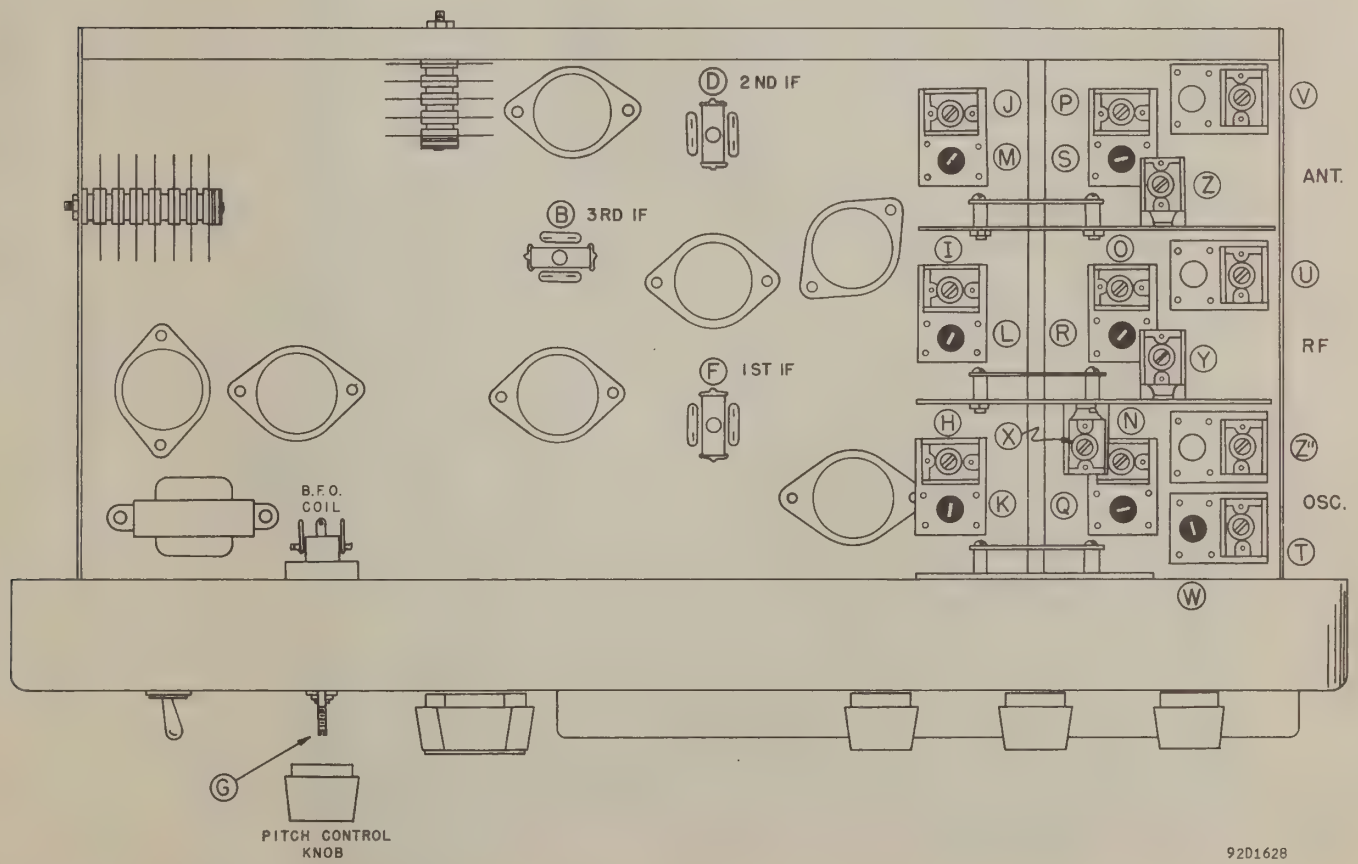


Fig. 4. Top View of Chassis Showing Location of Alignment Adjustments, Tubes and Dial Lamp

92C1654



92D1628

Fig. 5. Bottom View of Chassis Showing Location of Alignment Adjustments

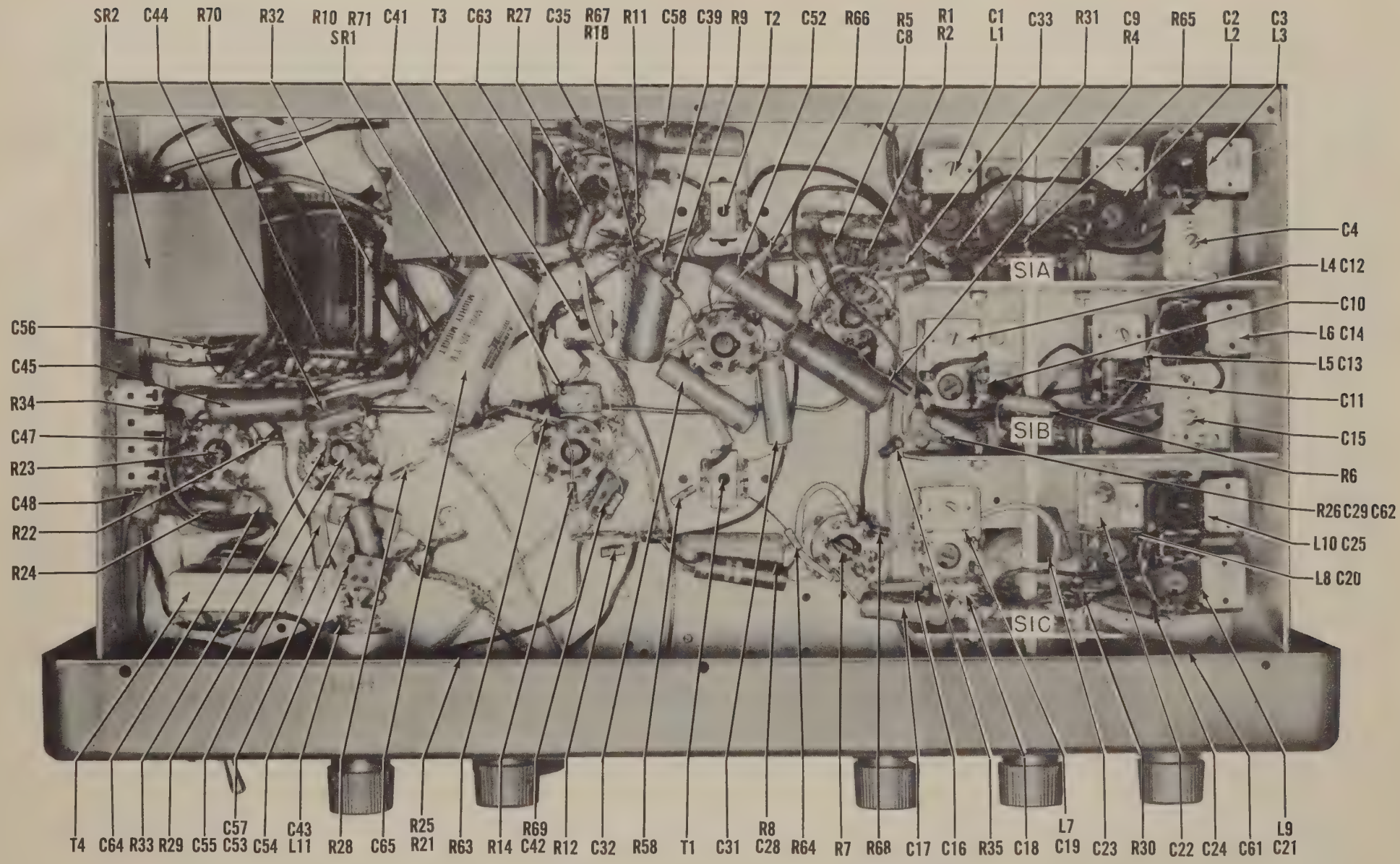


Fig. 6. Bottom View of Chassis Showing Component Location

92X1655

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3,12, 13,14,19, 20,21	Trimmers; part of coils L-1, 2, 3,4,5,6,7,8 and 9 respectively	---------
C-4,15,22	Trimmer, 1.5-15 mmf.	44A191
C-7A, B and C	Tuning capacitor, 3 section	•48C281 or ▪48C291
C-8,32,35,58	.05 mfd. 200 V., tubular	46AU503J
C-9,28	.05 mfd. 600 V., tubular	46AY503J
C-10	22 mmf. 500 V., ceramic	47X21UK220M
C-11	15 mmf. 500 V., ceramic	47X21UK150M
C-16	390 mmf. 500 V., mica	47X20B391K
C-17,53	.01 mfd. 600 V., tubular	46AY103J
C-18	68 mmf. 500 V., ceramic	47X25UK680K
C-23	3000 mmf. 500 V., mica	47X30C302K
C-24	1500 mmf. 500 V., mica	47X30C152J
C-25	Padder; part of coil L-10	---------
C-29,33	220 mmf. 500 V., mica	47X20B221K
C-31,43	.02 mfd. 200 V., tubular	46AU203J
C-38	2 mmf., twisted wire assembly	---------
C-39	.1 mfd. 600 V., tubular	46AY104J
C-41,42	47 mmf. 500 V., mica	47X20B470M
C-44,55	270 mmf. 500 V., mica	47X20B271K
C-45,48,52,63	.02 mfd. 600 V., tubular	46AY203J
C-47	.002 mfd. 1000 V., tubular	46A104
C-54	470 mmf. 500 V., mica	47X20B471J
C-56	.01 mfd. 600 V., molded tubular	46AC103J
C-57	1000 mmf. 500 V., mica	47X25B102M
C-61	.25 mfd. 200 V., tubular	46AT254J
C-62	2.2 mmf. 500 V., bakelite gimmick	47A160-4
C-64	10 mfd. 25 V., electrolytic	45A121
C-65A and B	Dual 8 mfd. 475 V., electrolytic	45B169
C-66A and B	Dual 40 mfd. 450 V., electrolytic	45B159
C-67	80 mfd. 150 V., electrolytic	45B178
	RESISTORS	
R-1	1 megohm 1/2 watt, carbon	23X20X105M
R-2	120 ohms 1/2 watt, carbon	23X20X121K
R-3	10,000 ohms, SENSITIVITY control	25B590
R-4,31	22 ohms 1/2 watt, carbon	23X20X220M
R-5	39,000 ohms 1 watt, carbon	23X30X393K
R-6,26	6800 ohms 1 watt, carbon	23X30X682K
R-7	18,000 ohms 1/2 watt, carbon	23X20X183K
R-8	10,000 ohms 2 watts, carbon	23X40X103K
R-9	470 ohms 1/2 watt, carbon	23X20X471K
R-10,71	15,000 ohms 2 watts, carbon	23X45K153K
R-11,18,65	1000 ohms 1/2 watt, carbon	23X20X102K
R-12	2.2 megohms 1/2 watt, carbon	23X20X225M
R-14	47,000 ohms 1/2 watt, carbon	23X20X473M
R-20	500,000 ohms, VOLUME control	25B605
R-21	150 ohms 1/2 watt, carbon	23X20X151M
R-22	270,000 ohms 1/2 watt, carbon	23X20X274K
R-23,69	470,000 ohms 1/2 watt, carbon	23X20X474M
R-24	680 ohms 1 watt, carbon	23X20X681K
R-25	15,000 ohms 1 watt, carbon	23X30X153M
R-27,66	47,000 ohms 1 watt, carbon	23X30X473K
R-28	22,000 ohms 1/2 watt, carbon	23X20X223M
R-29,58	100,000 ohms 1/2 watt, carbon	23X20X104M
R-30,68	10 ohms 1/4 watt, carbon	23X10X100M
R-32	1500 ohms 10 watts, wirewound	24BG152E
R-33	15 megohms 1/4 watt, carbon	23X10X156M
R-34	10,000 ohms 1/2 watt, carbon	23X20X103M
R-35	27 ohms 1/4 watt, carbon	23X10X270K
R-63	6.8 ohms 1 watt, carbon	23X30X068K
R-64	330 ohms 1/2 watt, carbon	23X20X331K
R-67	330,000 ohms 1/2 watt, carbon	23X20X334K
R-70	10 ohms 1 watt, carbon	23X30X100K
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; band 4	51B783
L-2	Coil, antenna; band 3	51B782
L-3	Coil, antenna; bands 1 and 2	51B1241
L-4	Coil, RF; band 4	51B787
L-5	Coil, RF; band 3	51B786
L-6	Coil, RF; bands 1 and 2	51B1240
L-7	Coil, oscillator; band 4	51B791
L-8	Coil, oscillator; band 3	51B913
L-9	Coil, oscillator; band 2	51B789
L-10	Coil, oscillator; band 1	51B912
L-11	Coil, BFO	54B044

Schematic Symbol	Description	Hallicrafters Part Number
	COILS AND TRANSFORMERS (Cont.)	
T-1,2	Transformer, 1st and 2nd IF	50C243
T-3	Transformer, IF; detector stage	50C242
T-4	Transformer, audio output	55B093
T-5	Transformer, power	52C212
	SWITCHES	
S-1A	Switch wafer, BAND SELECTOR; antenna stage	⊙60B389 or *62B070
S-1B	Switch wafer, BAND SELECTOR; RF stage	⊙62B039 or *62B072
S-1C	Switch wafer, BAND SELECTOR; oscillator stage	⊙62B044 or *62B071
S-2	Switch, toggle (s.p.d.t.); PHONO-RADIO	60A139
S-3A,B & C	Switch, CW-TONE	60B469
S-4	Switch, OFF-ON; part of VOLUME control R-20	---------
	Shaft and index plate, BAND SELECTOR	⊙60B392 or *60B485
	PLUGS AND SOCKETS	
J-1	Jack, PHONES	36A002
J-2	Jack, PHONO	36A029
PL-1	Line cord and plug	87B1573
SO-1	Socket assembly, phono motor (model 8R40C)	87B1901
	Socket, tube; octal	6A250
	TUBES AND DIAL LAMPS	
V-1	6SG7: RF amplifier	90X6SG7
V-2	6SA7: converter	90X6SA7
V-3,4	6SK7: 1st and 2nd IF amplifiers	90X6SK7
V-5	6SC7: BFO and audio amplifier	90X6SC7
V-6	6K6GT: audio output	90X6K6GT
V-7	6H6: AVC and detector	90X6H6
LM-1	Lamp, dial; type 44	39A003
	MISCELLANEOUS PARTS	
	Adaptor, 7-inch record (Model 8R40C)	8D1246
	Back, cabinet (Model 8R40C)	8D1733
	Background, dial; paper	32B488
	Bracket, mtg.; front (for mtg. tuning capacitor)	•67A671 or ▪67A678
	Bracket, mtg.; rear (for mtg. tuning capacitor)	•67A555 or ▪67A556
	Cabinet, Model 8R40 (does not include front panel or top cover)	66D359
	Cabinet, Model 8R40C	78F824
	Clip, IF mtg.	76A385
	Cord, dial (specify length)	38A001
	Dial	83E407
	Dial light assembly	86A125
	Escutcheon	7C248
	Foot, mtg.; rubber (Model 8R40)	16A007
	Glass, escutcheon	22B319
	Iron core; for coils L-1,2,4,5, 7,8 and 9	77A068
	Knob, SENSITIVITY, BAND SELECTOR, VOLUME and CW-TONE	15A468
	Knob, PITCH CONTROL	15B470
	Knob, TUNING and BANDSPREAD	15A048
	Lock, line cord; male section	76A397-1
	Lock, line cord; female section	76A397-2
	Panel, front (Model 8R40)	68D199
	Panel, front (Model 8R40C)	68A206
	Pointer, dial; TUNING	82A199
	Pointer, dial; BANDSPREAD	82A209
	Record changer, complete (Model 8R40C)	115A144
SR-1,2	Rectifier, selenium; 300 ma	27A155
	Shield, speaker (Model 8R40C)	8D1674
LS-1	Speaker, 5-inch PM (Model 8R40)	85B050
LS-1	Speaker, 8-inch PM (Model 8R40C)	85C111
	Spring, dial; 11/16"	75A012
	Spring, dial; 25/64"	75A173
TS-1	Terminal strip, antenna	88A032
TS-2	Terminal strip, speaker	88A816
	Top, cabinet (Model 8R40)	66D616

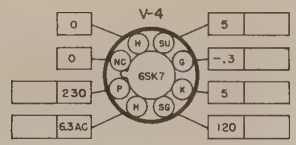
• When tuning capacitor 48C281 is used, brackets 67A555 and 67A671 must be used in conjunction with it.

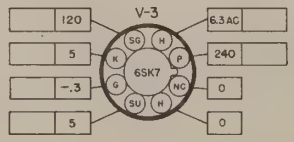
▪ When tuning capacitor 48C291 is used, brackets 67A556 and 67A678 must be used in conjunction with it.

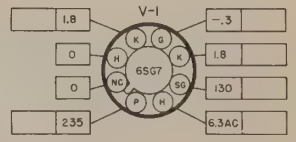
⊙ Switch wafers 60B389, 62B039 and 62B044 can be used only in conjunction with shaft and index plate 60B392.

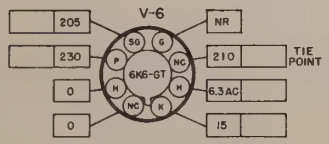
* Switch wafers 62B070, 62B072 and 62B071 can be used only in conjunction with shaft and index plate 60B485.

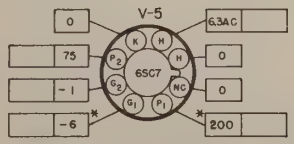
CONTROL	SETTING
SENSITIVITY	FULLY CLOCKWISE
BAND SELECTOR	POSITION - 1
VOLUME	FULLY COUNTERCLOCKWISE
TUNING	FULLY MESHED
BANDSPREAD	FULLY OPEN
CW-TONE	HIGH
PHONO-RADIO	RADIO



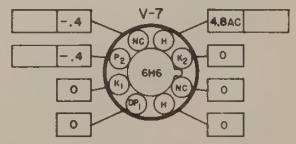


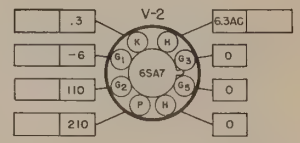






* CW-TONE SWITCH IN CW POSITION.



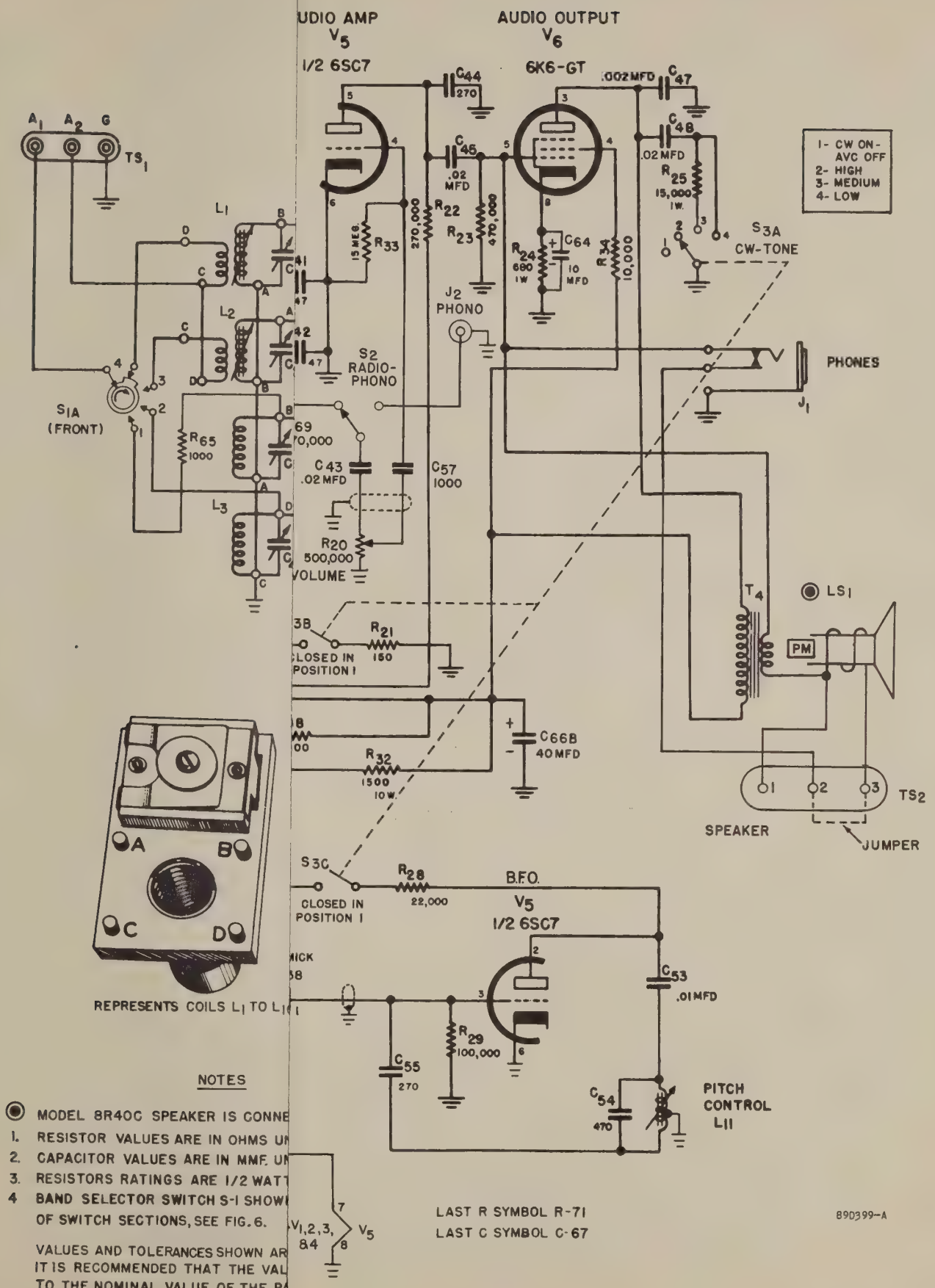


NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE 117 V. AC.
4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC"—NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR"—NOT READABLE (READING GENERALLY MEANINGLESS).
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS.

FRONT APRON
BOTTOM VIEW OF CHASSIS

Fig. 7. Tube Socket Voltage Chart

92E1656



NOTES

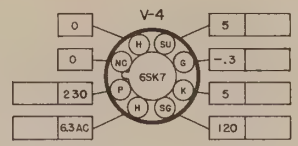
- MODEL 8R40C SPEAKER IS CONNE
1. RESISTOR VALUES ARE IN OHMS UN
2. CAPACITOR VALUES ARE IN MMF. UN
3. RESISTORS RATINGS ARE 1/2 WATT
4. BAND SELECTOR SWITCH S-1 SHOWN OF SWITCH SECTIONS, SEE FIG. 6.

VALUES AND TOLERANCES SHOWN AR
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TO THE NOMINAL VALUE OF THE PA

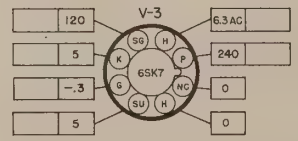
LAST R SYMBOL R-71
LAST C SYMBOL C-67

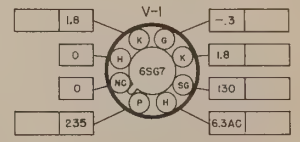
890399-A

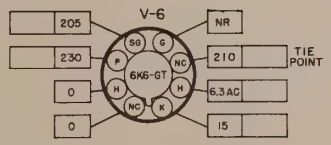
Fig. 8. Schematic Diagram

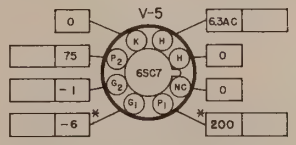


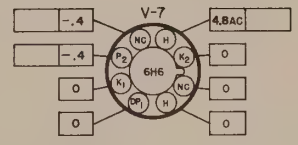
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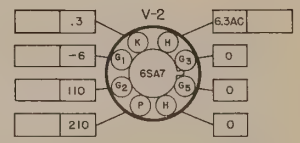








* CW-TONE SWITCH IN CW POSITION.

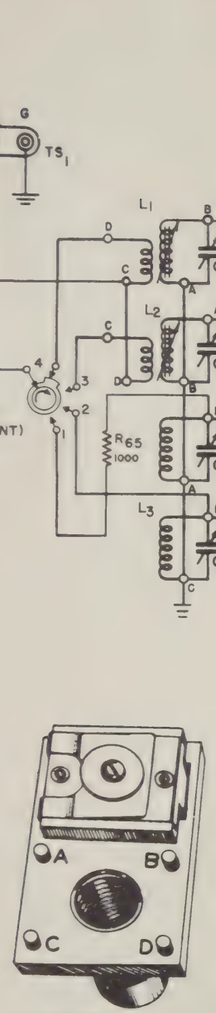


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FRONT APRON
BOTTOM VIEW OF CHASSIS

Fig. 7. Tube Socket Voltage Chart

92E1656



REPRESENTS COILS L_1 TO L_{10}

NOTES

◉ MODEL 8R40C SPEAKER IS CONNECTED TO 1 AND 2.

1. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
3. RESISTORS RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH S-1 SHOWN IN BAND 4 POSITION. FOR LOCATION OF SWITCH SECTIONS, SEE FIG. 6.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

Fig. 8. Schematic Diagram

890399-A

SHORTWAVE STATION LOG

STATION	CITY	TIME	BAND	TUNING DIAL SETTING	BAND SPREAD DIAL SETTING

Warranty

"This product is warranted to be free from defective material or parts, and it is agreed to furnish a new part in exchange for any part of this unit which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to the authorized radio dealer or wholesaler from whom purchased, intact, for examination with all transportation charges prepaid, within ninety days from the date of sale to original purchaser and provided that such examination discloses that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our authorized facilities, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

94 X 561

the Hallicrafters co.

BOOK NO. 94X874
1251- RUN 1

hallicrafters Continental

BROADCAST — SHORTWAVE PORTABLE

OPERATING and SERVICE INSTRUCTIONS

5R40

RUN 1

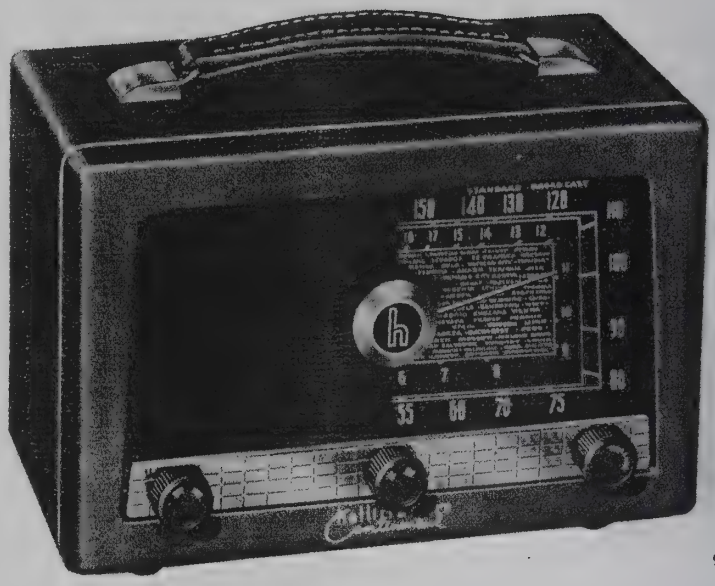
the hallicrafters co.

MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

Your Hallicrafters 5R40 portable radio tunes the full standard broadcast band and the shortwave range from 5.8 to 18.3 megacycles to bring you outstanding world-wide radio reception. It is a 4 tube superheterodyne radio and will operate on batteries or 105 to 125 volt AC/DC current. It uses a selenium rectifier which makes instantaneous playing possible on AC or DC as well as batteries.

Your receiver contains a sensitive built-in antenna for standard broadcast reception which eliminates the need for an external antenna. A separate external antenna is required, however, for shortwave reception. In most localities, good results can be obtained with the 15 foot antenna wire included with your receiver. It is merely necessary to uncoil the wire, connect one end of it to terminal A on the back of the set and then run it about the room in any convenient manner.



Hallicrafters Model 5R40

For your convenience, the principal shortwave stations of the world have been clearly marked on the dial. Since shortwave reception conditions vary with the season of the year and even with the time of day, shortwave programs may not be heard with the same regularity as standard broadcasts. To aid you in determining the most favorable times for shortwave listening, a special table has been provided below.

BEST SHORTWAVE RECEPTION TABLE

Band	Most Favorable Time	Most Favorable Distance
6-7 MC	Night - Winter	Day - 400 miles Night - Over 1500 Miles
9-10 MC	Day - Late Afternoon and Night - Winter	Over 500 miles
11-12 MC	Evenings or Late Summer Afternoons	Day - Under 1500 Miles Night - Over 1500 Miles
15-18 MC	Early Mornings and Summer Evenings	Over 1500 Miles

INSTALLATION INSTRUCTIONS

STANDARD BROADCAST ANTENNA - The sensitive built-in antenna in your receiver eliminates the need for an external antenna for standard broadcast reception.

SHORT WAVE ANTENNA - Two terminals are provided on the back of the set for the shortwave antenna and ground connections. Good results can be obtained in most localities with the 15 foot antenna wire included with your receiver. Simply uncoil the wire, connect one end of it to terminal A and run it about the room in a convenient manner. An outside antenna 30 to 60 feet long (ordinary copper wire) may be necessary if the receiver is to be operated in a difficult reception area or steel constructed building. In some locations, reception may be improved by connecting a wire lead from terminal G to a cold water pipe or outside ground rod.

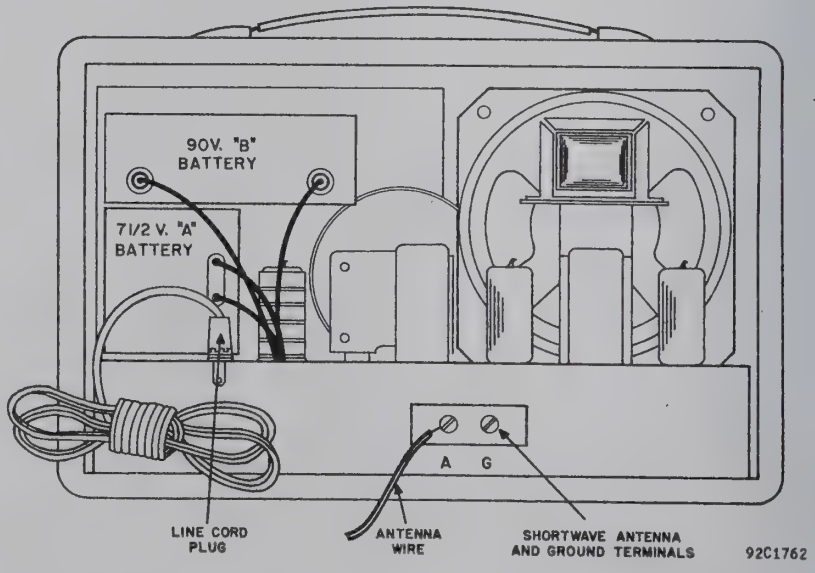


Fig. 1. Rear View of Receiver with Cabinet Back Removed

OPERATING INSTRUCTIONS

BATTERY OPERATION

1. Remove the cabinet back by unfastening the leather strap and pulling outward at the top of the cabinet back.
2. Select the required batteries from the battery replacement list on page 4.
3. Place the batteries into the compartment at the left side of the cabinet and insert the battery connectors into the receptacles provided on the batteries.
4. Insert the LINE CORD PLUG into the CHASSIS RECEPTACLE on the top left of the chassis (see Fig. 1).

AC/DC OPERATION (105-125 Volts DC or 50/60 Cycles AC)

1. Insert the line cord plug into a convenient power outlet.
2. When operating on DC, reverse the line cord plug if the radio does not operate after having been turned ON. On DC, the set will operate ONLY with the plug in one position.

TUNING DIAL

1. The outer dial scale is the standard broadcast band and is calibrated in kilocycles, minus the last zero. To convert the dial reading to kilocycles simply add one zero.
2. The inner dial scale is the shortwave portion of the dial and is calibrated directly in megacycles.

TUNING

1. Set the BC-SW knob to BC for standard broadcast reception or to SW for shortwave reception.
2. Turn the set on by rotating the OFF-VOLUME knob clockwise.
3. Turn the TUNING knob slowly to the desired station and readjust the OFF-VOLUME knob for the desired volume.

   NOTE - The built-in antenna provided for standard broadcast reception is directional. If satisfactory reception of a standard broadcast station is not obtained, rotate the entire receiver for the position which will provide the greatest signal.
4. To turn the set off, rotate the OFF-VOLUME knob counterclockwise until a click is heard.

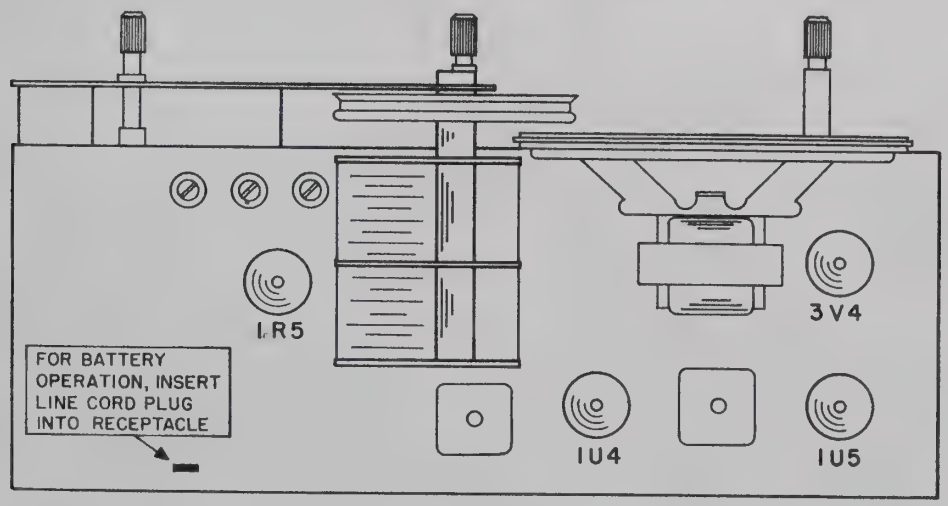


Fig. 2. Top View of Chassis Showing Tube Location

SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of your receiver, contact your dealer. Make no service shipments to the factory. The Hallicrafters Company maintains an extensive system of authorized factory service centers where any required service can be performed promptly and efficiently at a nominal charge. The sign shown at the right is displayed by all authorized service centers.

Authorized hallicrafters Service Center

radio

94X1401-R

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes and Rectifiers . . 4 tubes and 1 selenium rectifier
Power Supply . . 105-125 volts DC/50-60 cycle AC or 90 and $7\frac{1}{2}$ volt batteries
Frequency Coverage. . . BC - 535 to 1620 KC
SW - 5.8 to 18.3 MC
Intermediate Frequency . . . . . 455 KC
Speaker . . . . . 4-inch PM
Voice Coil Impedance . . . . . 3.2 ohms
Antenna BC - Built-in stick loop
SW - Terminals for single wire or doublet

REPLACEMENT BATTERIES

$7\frac{1}{2}$ Volt "A" - RCA VS065, Burgess C5, Eveready 717, Ray-O-Vac P751

90 Volt "B" - RCA VS090, Burgess N60, Eveready 490, Ray-O-Vac 4390

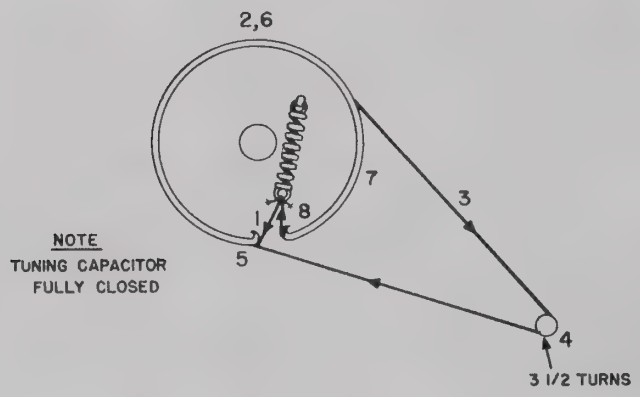
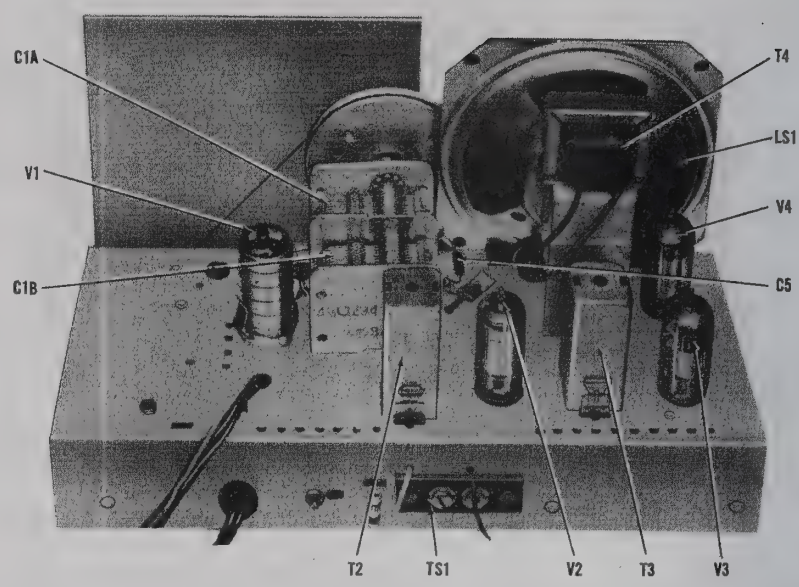


Fig. 4. Dial Cord Stringing Diagram

92B1733



92X1764

Fig. 3. Top View of Chassis Showing Component Location

DIAL CORD STRINGING - Set the tuning capacitor in a fully meshed position. Tie one end of a 30-inch length of 30 lb. test dial cord to the tension spring at position 1 as shown in Fig. 4. Follow the stringing procedure 1 through 8. At position 8, stretch the spring and tie the cord securely to the spring. Cut off the loose ends of the cord and apply a drop of quick drying cement to the knot. With the tuning capacitor fully meshed, align the pointer so that it points vertically downward.

ALIGNMENT PROCEDURE

- Connect output meter across voice coil.
- Set volume control at maximum.
- Use a non-metallic alignment tool.
- Stick loop antenna must be connected.
- Refer to Fig. 5 for location of alignment adjustments.
- Generator must have modulated output and cover 455 KC, 600 KC, 1400 KC and 14 MC.
- To avoid AGC action, use lowest output setting of signal generator that gives satisfactory reading on meter.

Step	Signal Generator Connections	Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust for Maximum Output
1	High side thru .01 mfd capacitor to green lead of stick loop antenna. Low side to white lead or chassis.	455 KC	BC	1000 KC	A and B (2nd IF) C and D (1st IF)
2	High side thru 300 ohm carbon resistor to terminal A on back of set. Low side to G.	14 MC	SW	14 MC	E (SW osc. trimmer) F (SW ant. trimmer)
3	Place generator lead close to stick loop antenna. No actual connection.	1400 KC	BC	1400 KC	G (BC osc. trimmer) H (BC ant. trimmer)
4	Same as Step 3.	600 KC	BC	600 KC	J (BC osc. padder)

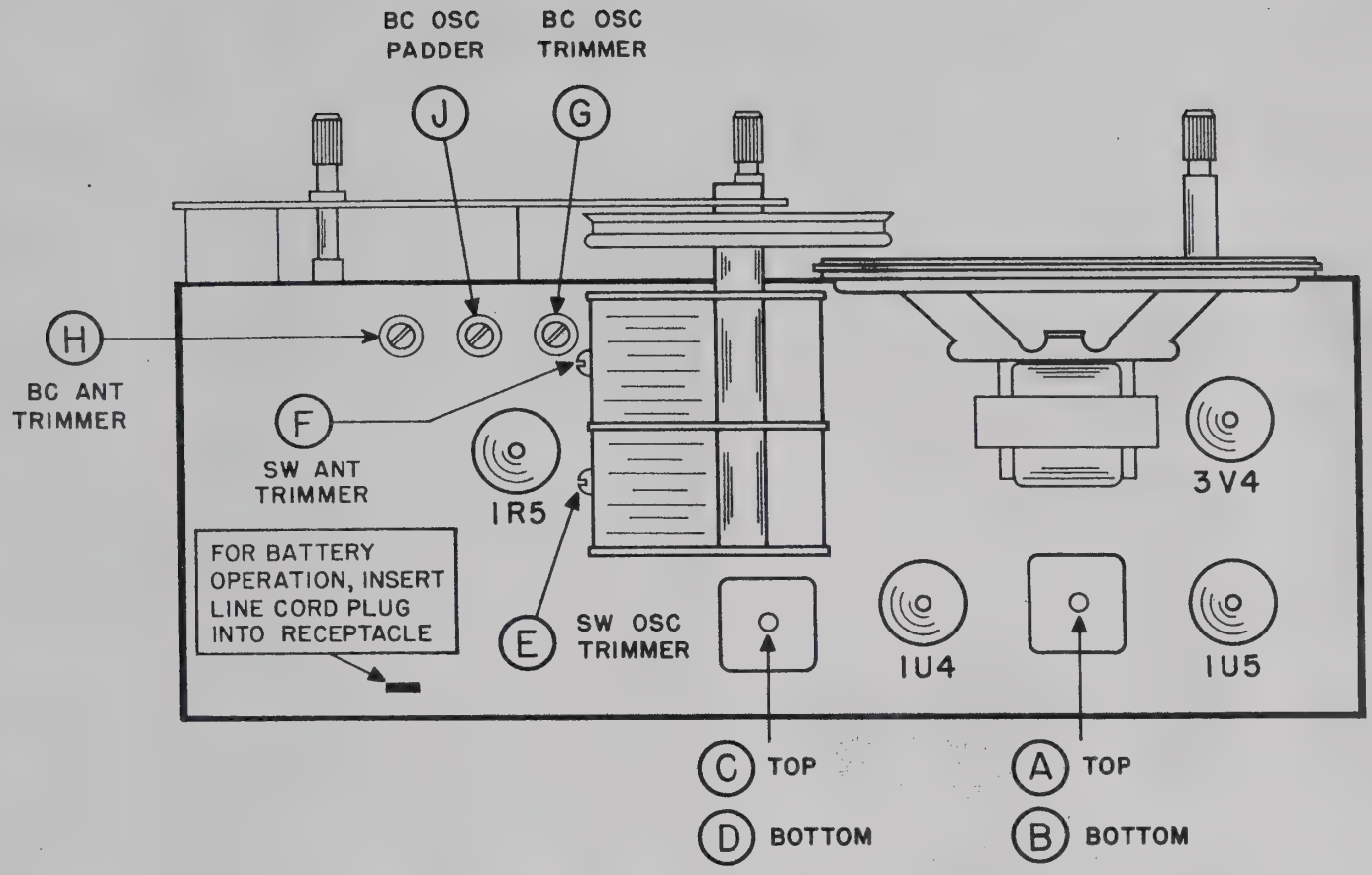


Fig. 5. Top View of Chassis Showing Location of Alignment Adjustments

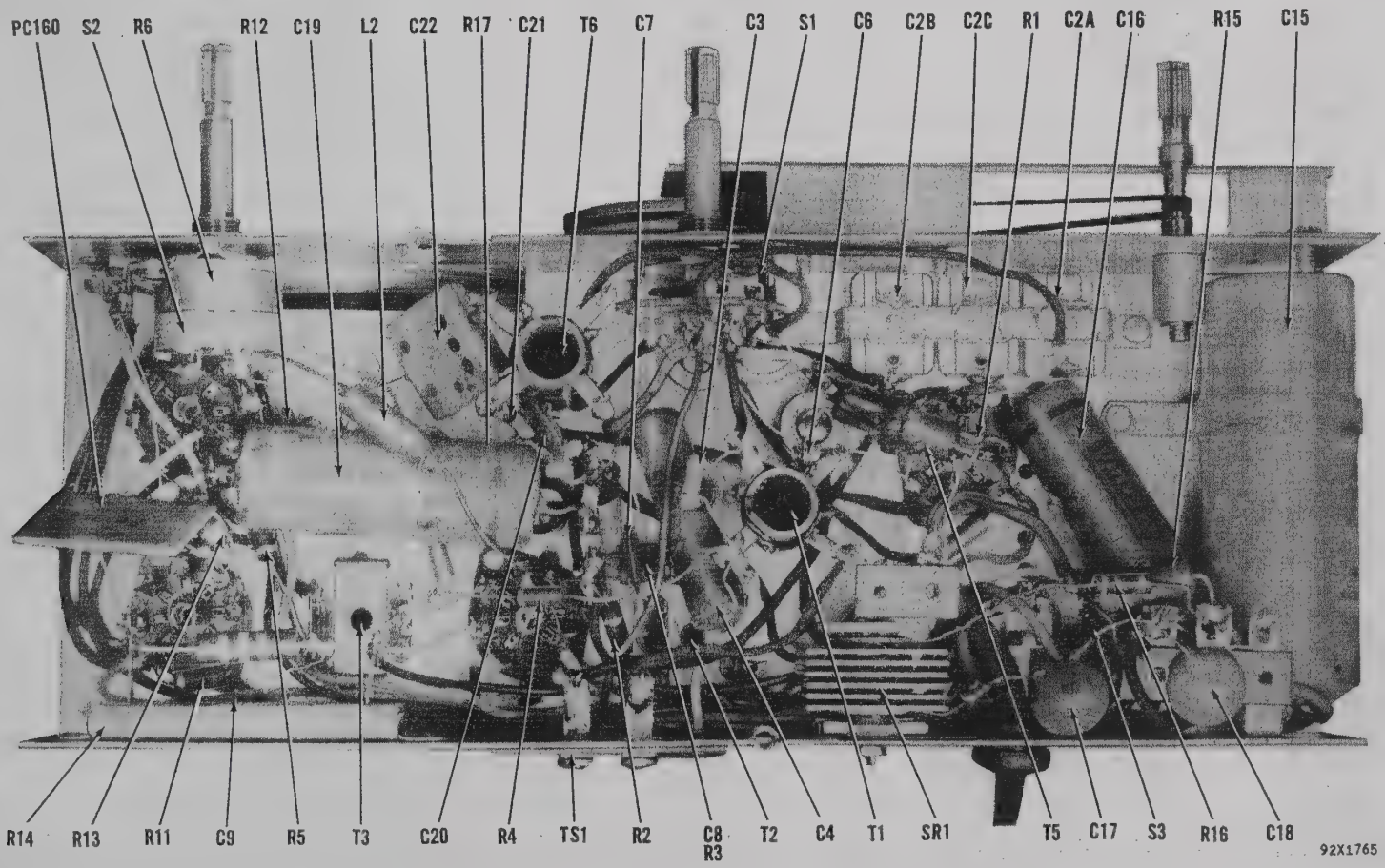


Fig. 6. Bottom View of Chassis Showing Component Location

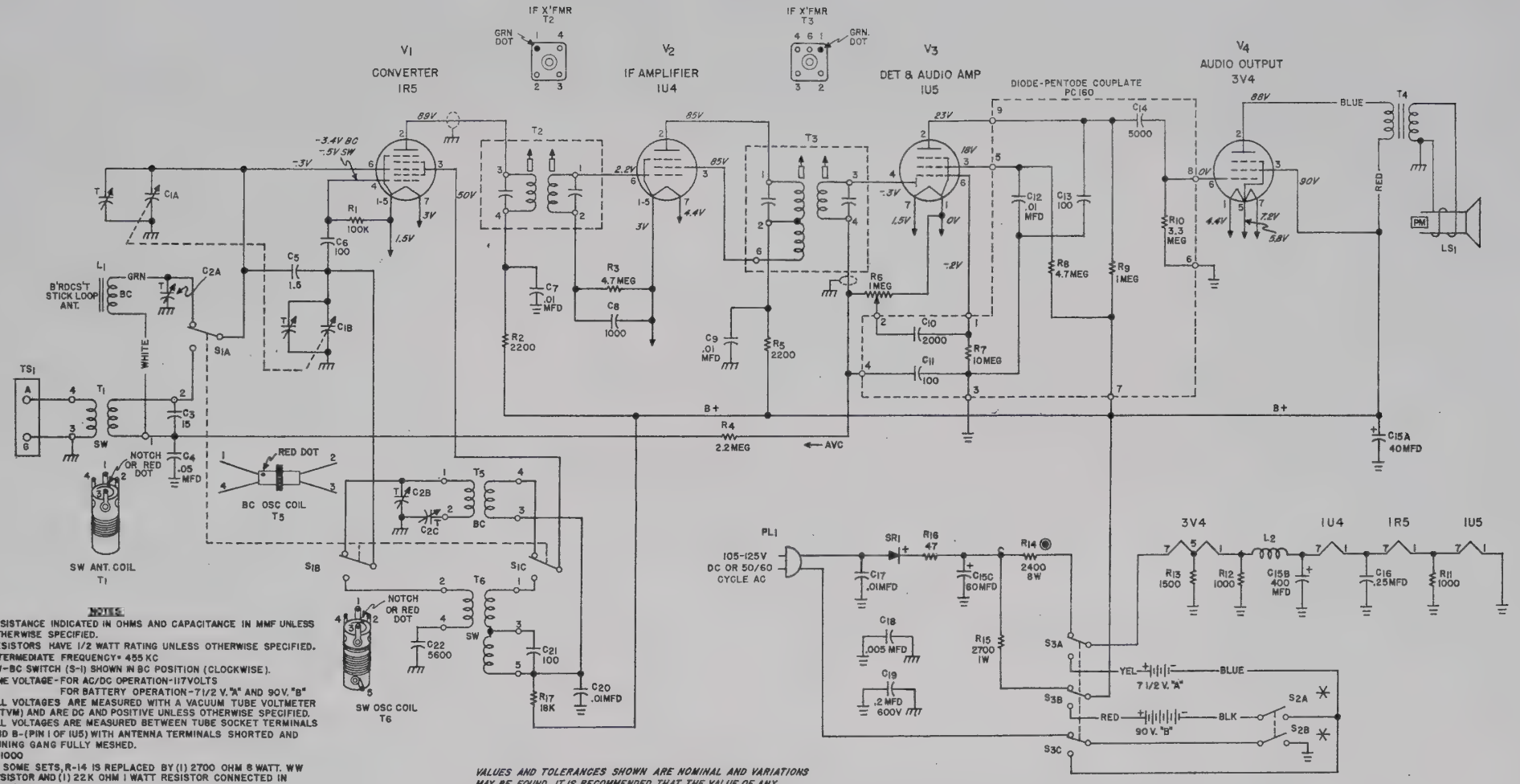
SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1A & B	Tuning capacitor; 2 section	48C294
C-2A, B & C	Trimmer assembly; 3 section	44C419
C-3	15 mmf. 500V., ceramic	47X20UK150K
C-4	.05 mfd. 200V., tubular paper	46AW503J
C-5	1.5 mmf. bakelite gimmick	47A160-3
C-6,21	100 mmf. 500V., ceramic	47X25UK101K
C-7,9,17, 20	.01 mfd. 500V., ceramic disc	47A217
C-8	1000 mmf. 500V., ceramic	47B20A102M5
*C-10	2000 mmf., ceramic	- - - - -
*C-11	100 mmf., ceramic	- - - - -
*C-12	.01 mfd., ceramic	- - - - -
*C-13	100 mmf., ceramic	- - - - -
*C-14	5000 mmf., ceramic	- - - - -
C-15A, B & C	Capacitor, electrolytic; triple section; 40 mfd. 150V., 400 mfd. 15V., 60 mfd. 150V.	45B206
C-16	.25 mfd. 200V., tubular paper	46AT254J
C-18	.005 mfd. 500V., ceramic disc	47A168
C-19	.2 mfd. 600V., tubular paper	46AX204H
C-22	5600 mmf. 500V., mica	47X35B562K
	RESISTORS	
R-1	100,000 ohms ½ watt, carbon	23X20X104K
R-2,5	2200 ohms ½ watt, carbon	23X20X222K
R-3	4.7 megohms ½ watt, carbon	23X20X475K
R-4	2.2 megohms ½ watt, carbon	23X20X225K
R-6	Volume control; 1 megohm; includes on-off switch S-2	25B1005
*R-7	10 megohms, ½ watt	- - - - -
*R-8	4.7 megohms, ½ watt	- - - - -
*R-9	1 megohm, ½ watt	- - - - -
*R-10	3.3 megohms, ½ watt	- - - - -
R-11,12	1000 ohms ½ watt, carbon	23X20X102K
R-13	1500 ohms ½ watt, carbon	23X20X152K
R-14	2400 ohms 8 watts, wirewound	24B938
R-15	2700 ohms 1 watt, carbon	23X30X272K
R-16	47 ohms ½ watt, carbon	23X20X470K
R-17	18,000 ohms ½ watt, carbon	23X20X183K
	COILS AND TRANSFORMERS	
L-1	Antenna, stick loop; for broadcast band	57B167
L-2	Choke, RF	53A008
T-1	Coil, antenna; SW	51B1535
T-2	Transformer, 1st IF	50C233
T-3	Transformer, 2nd IF	50C516
T-4	Transformer, audio output; part of speaker LS-1	- - - - -
T-5	Coil, oscillator; BC	51B1534
T-6	Coil, oscillator; SW	51B1543

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1A, B & C	Switch, rotary; BC-SW	60B487
S-2A & B	Switch, on-off; part of volume control R-6	- - - - -
S-3A, B & C	Switch, battery change-over	60B502
	PLUGS AND SOCKETS	
	Plug assembly, "A" battery; includes leads	87A1971
	Plug assembly, "B" battery; female (includes lead)	87A3508
	Plug assembly, "B" battery; male (includes lead)	87A3593
	Socket, tube; miniature 7 pin	6B404
	TUBES AND RECTIFIERS	
V-1	1R5: converter	90X1R5
V-2	1U4: IF amplifier	90X1U4
V-3	1U5: detector, AVC and audio amplifier	90X1U5
V-4	3V4: audio output	90X3V4
SR-1	Selenium rectifier, 75 ma.	27A172
	MISCELLANEOUS PARTS	
	Cabinet; does not include front panel assembly	78F854
	Cabinet front panel assembly	7D379
	Clip, mtg.; for SW osc. coil T-6	76A326
	Clip, mtg.; for SW ant. coil T-1	76A868
	Clip, mtg.; for IF transformers T-2 and T-3	76A385
PC-160	Couplate, diode-pentode; consists of C-10, 11, 12, 13 and 14 and R-7,8,9 and 10. (see schematic)	49C022
	Dial cord (30" length needed)	38A026
	Dial scale	83D418
	Grommet, rubber (gang mounting)	16A128
	Knob, BC-SW	15B525
	Knob, OFF-VOL	15B529
	Knob, TUNING	15B526
	Line cord and plug PL-1	87A3592
	Lock, line cord	76A974
	Pointer, dial	82A220
LS-1	Speaker, 4-inch PM; includes audio output transformer T-4 and mounting bracket	85C129
	Spring, dial cord tension	75A012
TS-1	Terminal board, SW antenna	88B809

* Part of diode-pentode couplate PC-160.

MODEL 5R40
RUN 1



NOTES

1. RESISTANCE INDICATED IN OHMS AND CAPACITANCE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTORS HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. INTERMEDIATE FREQUENCY= 455 KC
4. SW-BC SWITCH (S-1) SHOWN IN BC POSITION (CLOCKWISE).
5. LINE VOLTAGE-FOR AC/DC OPERATION-117VOLTS
   FOR BATTERY OPERATION-7 1/2 V. "A" AND 90 V. "B"
6. ALL VOLTAGES ARE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM) AND ARE DC AND POSITIVE UNLESS OTHERWISE SPECIFIED.
7. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND B-(PIN 1 OF 1U5) WITH ANTENNA TERMINALS SHORTED AND TUNING GANG FULLY MESHED.
8. K=1000

◉ IN SOME SETS, R-14 IS REPLACED BY (1) 2700 OHM 8 WATT. WW RESISTOR AND (1) 22K OHM 1 WATT RESISTOR CONNECTED IN PARALLEL.

✱ PART OF VOLUME CONTROL R6.

⏚ B- (COMMON GROUND)

⏚ CHASSIS

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89E422-A

Warranty

"This product is warranted to be free from defective material or parts, and it is agreed to furnish a new part in exchange for any part of this unit which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to the authorized radio dealer or wholesaler from whom purchased, intact, for examination with all transportation charges prepaid, within ninety days from the date of sale to original purchaser and provided that such examination discloses that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our authorized facilities, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

94 X 561

the Hallicrafters co.

BOOK NO. 94X911
352 — RUN 1

the new ideas in
communications are born at **hallicrafters**





1964

amateur equipment catalog







The new ideas from hallicrafters are proven ideas . . .

Behind the scenes at Hallicrafters is a rarely-publicized Quality Control Complex unequalled in the industry for the depth of its probing and uncompromising standards. The facilities and equipment for these tests alone are the equivalent of a fair-sized factory. Here is where—and how—Hallicrafters' performance and reliability are proven *in advance*.



Quality begins with quality components. Periodic samples of more than 28,000 different parts are subjected to 100% inspection, rejected if exacting specifications are not met. Thousands of testing procedures are used in this department! Even the laboratory instruments used in our quality control and production procedures are calibrated periodically.

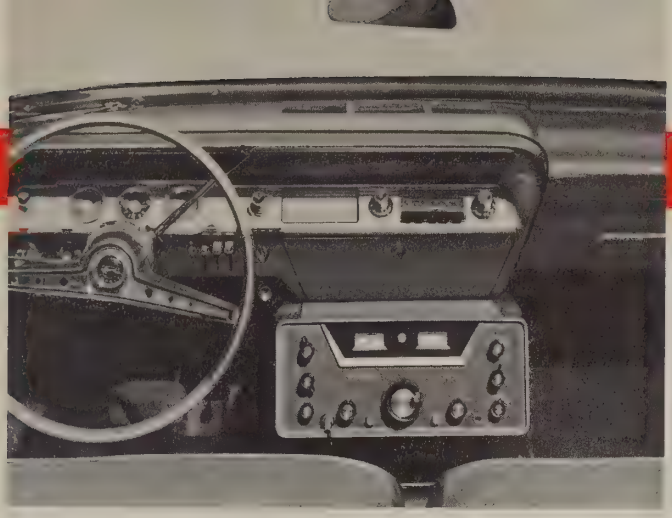
Why we shake and bake them. We virtually eliminate two common sources of trouble with the unusual procedures shown here. Loose or faulty connections are detected on the shake table. Later, assembled units ride smoothly through an oven—where heat far in excess of normal operation actually relaxes and equalizes tensions on all components to insure long term frequency stability.

Measuring VFO frequency drift vs. temperature is the sole function of this entire department. For more than six years, Hallicrafters VFO's have been subjected to this exacting and critical procedure. Units are placed in oven (center), and frequency drift is automatically plotted over a temperature range from 86° to 175° F. The slightest deviation from standard means rejection.

Worked for a lifetime in 30 days! In this department samples of daily production are measured against engineering standards by every conceivable operation check —for selectivity, sensitivity, alignment, hum and noise, distortion products, power, etc. Here too is another proving ground for Hallicrafters durability—continuous life tests where equipment is operated at full power for extended periods.

hallicrafters

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TRANSCEIVERS

SR-150 AMATEUR BAND FIXED-MOBILE TRANSCEIVER

Hallicrafters' new SR-150 is a rugged, lightweight, high-performance amateur band transceiver designed for maximum flexibility and convenience of operation in both fixed and mobile situations.

Advanced communications technology and proven, dependable design have been carefully blended to give you maximum performance under all potential environmental conditions—yet provide a range of operating features never before available at anything approaching the price.

GENERAL: Dial cal., 5 kc.; 100 kc. crystal cal.; VFO tunes 500 kc.; 18 tubes plus volt. reg., 10 diodes, one varicap. Rugged, lightweight aluminum construction (only 17½ lb.); size—6½″ x 15″ x 13″.

FREQUENCY COVERAGE: Eight-band capability—full coverage provided for 80, 40, 20 and 15 meters; 10M crystals furnished for operation on 28.5 to 29.0 Mc. Other crystals may be added for full 10 meter coverage without adjustment. Available for operation on specified non-amateur frequencies by special order.

FRONT PANEL CONTROLS: Tuning; Band Selector; Final Tuning; R. F. Level; Mic. Gain; Pre-Selector; R.I.T.; Rec. RF Gain; AF Gain; Operation (Off/Standby/MOX/VOX.); Function (CW/USB/LSB); Cal.

TRANSMITTER SECTION: (2) 12DQ6B output tubes. Fixed, 50-ohm Pi network. Power input—150W P.E.P. SSB; 125W CW. Carrier and unwanted SB suppression 50 db.; distortion prod., 30 db. Audio: 400-2800 c.p.s. @ 6 db.

RECEIVER SECTION: Sensitivity less than 1 uv for 20 db. signal-to-noise ratio. Audio output 2W; overall gain, 1 uv for ½ W output. 6.0 - 6.5 1st I.F. (tunes with VFO). 1650 kc. 2nd I.F.

POWER REQUIREMENTS: 12.6V @ 5A; 250V @ 220 ma; *500V @ 250 ma; - 75V @ 10 ma. *Transmit Only

SPECIAL FEATURES: *Receiver Offset Control* (R.I.T.) permits ±2 kc. adjustment of receiver frequency independent of transmitter for round-table, net or CW operation. (Patents applied for.) New Exclusive Hallicrafters *AALC* (*Amplified Automatic Level Control*). *Inverse Feedback on RF P.A.* Corrects for screen "knee" distortion inherent in all small beam power pentodes.

SR-160 THREE-BAND FIXED MOBILE TRANSCEIVER

A rugged, lightweight, high-performance amateur transceiver that covers the three most popular amateur bands. Excellent for fixed and mobile SSB and CW use. Crystal filter-type sideband generation. Hallicrafters famous R.I.T. Control and AALC. All jacks and switching for operation of linear amplifier are included in this new low cost transceiver.

Dial calibration 5 kc. Covers all of 80-40-20 meter amateur bands: Upper sideband on 20 meters and lower sideband on 40-80 meters. Aluminum construction. Weight only 13¼ lbs.; cabinet size 13″W x 6⅜″H x 11″D.

FRONT PANEL CONTROLS: R.I.T. On/Off. R.I.T. Frequency. RF Gain Control/AF Gain Control. Operation/Off. Receive Only. CW-TWNE-SSB-CAL., Dial Cal. Tuning. Band Selector. Driver Tune. Carrier Level/Mic. Gain. Final Tune.

TRANSMITTER SECTION: (2) 12DQ6B final amplifiers. Fixed 50-ohm PI network. Power input: 150W SSB, 125W max. CW. Carrier and unwanted sideband suppression, 50 db. Distortion products, 30 db. Audio, 600-2800 c.p.s. at 3 db.

RECEIVER SECTION: Sensitivity better than 1 uv for 20 db. signal-to-noise ratio. 100 db. a.v.c. figure of merit. Calibrator circuitry built-in (shipped less crystal and tube), uses same power supplies as SR-150.

Mobile mounting kit and plug-in VOX adaptor unit available. See "Accessories" page.



SR-160



SR-150

HT-32B TRANSMITTER. Preferred by the most experienced amateurs for SSB/AM/CW operation because of advanced features . . . beam-switching modulator with unusually high carrier suppression stability—CTO direct reading in kc., and complete 10-meter coverage.

FEATURES: Beam-deflection, high level sideband modulator for low-noise, high-stability signal, Hallicrafters' exclusive 5.0 Mc. quartz crystal filter with sideband rejection of 50 db. or more; CTO direct reading in kilocycles to within 1 kc.; 144 watts plate input (P.E.P. two-tone). Five band output (80, 40, 20, 15, 10 meters). All modes of transmission—CW, AM, SSB. Unwanted sideband down 50 db. or more. Both sidebands transmitted on AM Precision gear driven CTO. Exclusive Hallicrafters patented sideband selection. Logarithmic meter for accurate tuning and carrier level adjustment. Ideal CW keying and break-in operation, push-to-talk and full voice control system built in. Keying circuit brought out for teletype keyer.

FRONT PANEL CONTROLS, FUNCTIONS AND CONNECTIONS: Operation – power off, standby, Mox., Cal., Vox.—P.T.T. Audio level 0-10 R.F. level 0-10. Final tuning 80, 40, 20, 15, 10 meters. Function—upper sideband, lower sideband, DSB, CW. Meter compression. Calibration level 0-10. Driver tuning 0-5. Band selector—80, 40, 20, 15, 10 meters. High stability, gear driven VFO. Microphone, key and headphone monitor jacks.

TUBES AND FUNCTIONS: (2)-6146 Power output amplifiers. 6CB6 variable frequency oscillator. 12BY7 R.F. driver. 6AH6 2nd mixer. 6AH6 3rd mixer. 6AB4 crystal oscillator. 12AX7, 12AT7 and 6AL5 voice controls. Audio amp. 12AU7 audio amp. and carrier oscillator. 7360 modulator. 12AT7 sideband selecting oscillator. 6AH6 1st mixer. 6AH6 4.95 Mc. amp. 6AU6 9 Mc. amp. 5R4GY HV rectifier. 5V4G LV rectifier. OA2 voltage regulator.

REAR CHASSIS: Co-ax antenna connector, FSK jack, AC accessory outlet. Line fuse. Control connector, ground stud, AC power line cord. Cabinet 20″ wide, 10½″ high, and 17″ deep. Approximate shipping weight 86 lbs. (Conforms to F.C.D.A. specifications.)

SX-115 RECEIVER. First in its class for AM, CW and SSB reception. Truly a deluxe receiver offering band pass filter front end—equivalent of four tuned circuits preceding first mixer—crystal-controlled, high frequency oscillator—5 step selectivity plus exclusive upper-lower sideband selection—linear CTO, direct reading in kc. A perfect match for Hallicrafters' HT-32B and HT-33B exciters and transmitters.

FREQUENCY COVERAGE: Nine 500 kc segments covering 3.5-4.0 Mc.; 7.0-7.5 Mc.; 14.0-14.5 Mc., 21-21.5 Mc.; 28.0-30.0 Mc.; (4 segments); and WWV.

FEATURES: High order of mechanical and electrical stability; linear tuning; constant tuning rate; separate noise limiters for SSB/CW/AM; amplified dual loop AVC with fast attack-slow release; spurious signal and image rejection better than 60 db. 1 kc calibration marks; transmitter-type VFO with differential TC; 100 kc crystal calibrator; crystal controlled 1st and 3rd conversion oscillators; selectable sidebands; selectivity variable in five steps from 500 to 5000 cycles; product detector for SSB/CW envelope detector for AM; I.F. type noise limiter for SSB/CW automatic threshold series type for AM; band gain equalization; audio inverse feedbacks; "S" meter functions with AVC off.

SENSITIVITY: Less than 1 microvolt on AM—less than ½ microvolt on SSB/CW.

TUNING MECHANISM: Back-lash free gear driven tuning mechanism.

TUBES AND FUNCTIONS: 6DC6 R.F. amplifier – 6BA7 1st mixer – 12AT7 crystal oscillator – 6DC6 1st I.F. amplifier—6BA7—2nd mixer—6CB6 VFO—6DC6 2nd I.F. amplifier—6BA6 3rd mixer—12AT7 SSB switching oscillator—6DC6 3rd I.F. amplifier—6BY6 product detector—6BJ7 2nd AVC, AM detector, ANL—12AX7 BFO 1st audio amplifier—6AQ5 audio output—6AU6 100 kc crystal cal. —6AU6 "S" meter amplifier—6AU6 1st loop AVC amplifier—OA2 voltage regulator-five silicon diodes.

FRONT PANEL CONTROLS: R.F. gain; A.F. gain; tuning; selectivity; function selector (upper-lower SSB; upper-lower AM; on-off switch); cal set lock; receive-standby switch; notch frequency; BFO pitch; AVC/ANL (AVC on-off; SSB/CW ANL; AM/ANL); antenna trimmer; band switch; calibrator on-off; headphone jack.

AUDIO OUTPUT IMPEDANCE: 3.2 and 500 ohms.

POWER REQUIREMENTS: 105/125V, 50/60 cycles AC 85 watts.

PHYSICAL DATA: 16″ wide x 10½″ high x 16″ deep. Shipping weight 47 lbs.



HT-32B



SX-115



HT-33B

HT-33B LINEAR AMPLIFIER. Heavy duty components leave plenty of reserve for efficiency and long life.

FREQUENCY COVERAGE: Amateur bands 80, 40, 20, 15, 10 meters.

FEATURES: Rated conservatively at maximum legal input. Distortion products down in excess of 30 db. R.F. output meter for simplified tune-up. All important circuits metered. Pi-network. Variable output loading. Circuit breaker. A perfect match to Hallicrafters' famous HT-32B in size, appearance and drive requirements.

CIRCUIT DETAILS: A PL-172 operating in class AB1. Is grid-driven across a non-inductive resistor, assuring the maximum stability under all conditions. Single knob band switching selects the proper inductance for each band. The output circuit is a pi-network adjustable for loads from 40 to 80 ohms. 2 panel meters: one to measure grid current, screen current, plate voltage and R.F. output voltage. A second meter continuously monitors cathode current.

TUBES: (1) PL-172 high power pentode; (2) 3B28 rectifiers; (6) OA2 screen regulators.

FRONT PANEL CONTROLS: Meter selector; Filament switch; High Voltage switch; Bias adjustment; Bandswitch; Plate tuning; Plate loading.

PHYSICAL DATA: Gray and black steel cabinet (matches HT-32B). Cabinet: 20″ wide x 10½″ high x 17″ deep. Shipping weight approx. 130 lbs.

REAR CHASSIS: Co-ax input; co-ax output; filament and bias fuse; cutoff bias relay terminals; screen fuse; ground terminal.

HT-45 LIGHTWEIGHT TABLETOP, GROUNDED-GRID LINEAR AMPLIFIER

Covers 80-40-20-15-10 meter amateur bands, styled to match HT-44 and SX-117.

Complete metering—plate voltage, plate current, grid current, relative RF output. Uses a 3-400Z in a zero bias grounded-grid circuit. Runs full legal input when used with adequate plate supply. (P-45AC Power Supply available.)

FRONT PANEL CONTROLS: Band Selector, Plate Tuning, 80 Meter Switch, FIL On/Off, Plate On/Off, Meter Switch, Loading.

REAR CHASSIS: RF input, RF output, filament fuse, bias terminals. P-45 Power Supply recommended. See "Accessories" page.

PHYSICAL DATA: Cabinet size 15″W x 7⅛″H x 13″D. Weight 28 lbs.

SX-122 GENERAL COVERAGE RECEIVER

Outstanding performance is yours with Hallicrafters new SX-122 general coverage receiver. Dual conversion on all bands for excellent reception of AM/CW/SSB signals.

FREQUENCY COVERAGE: Standard Broadcast; 540-1600 kc.; Three S/W Bands, 1750 kc.—34 Mcs. Band 1: 540 kc.—1600 kc. —Band 2: 1750 kc.—4.9 Mcs.—Band 3: 4.8 Mcs.—12.6 Mcs.—Band 4: 12.5 Mcs.—34 Mcs. Bandspread calibrated for 80, 40, 20, 15, 10 meter and citizens bands.

FEATURES: Dual conversion. Antenna trimmer. Amplified A.V.C. Product detector for SSB/CW. Envelope detector for AM. Series noise limiter. Crystal-controlled 2nd conv. oscillator plus additional temperature compensation of high freq. oscillator circuits give utmost stability.

CONTROLS: BFO. Function. Phone jack. Antenna Trimmer. Calibrator On/Off. R.F. Gain. Audio Gain. Band Selector. Noise Limiter On/Off Selectivity. Main Tuning. Bandspread Tuning.

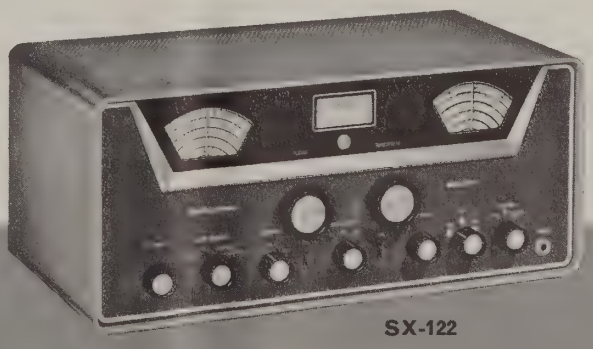
EXTERNAL CONNECTIONS: 3.2 ohm speaker and standby terminals, terminals for single wire or double antenna (external antenna provided), AC power cord, "S" meter electrical adjustment and mounting hole for co-axial cable connector. Phone jack on front panel.

TUBE COMPLEMENT: 6DC6-R.F. amplifier. 6AU6-1st mixer. 6C4-H.F. oscillator. 6DC6-1650 kc. i.f. amplifier. 6BL8-2nd mixer and crystal oscillator. 6BA6-50 kc. i.f. amplifier. 6BE6-BFO and product detector. 6BN8-AVC amplifier, AVC rectifier, AM detector. 6GW8-1st AF amplifier and audio output. 5Y3-Rectifier. IN456-ANL diode. OA2-Voltage regulator.

PHYSICAL DATA: 18¾″ wide, 8″ high, 9¾″ deep, weight 29 lbs.



HT-45



SX-122

TRANSMITTERS and RECEIVERS



SX-117



HT-44

SX-117 TRIPLE-CONVERSION RECEIVER

Hallicrafters newest—an exceptionally versatile and compact triple-conversion, superheterodyne communication receiver that's loaded with exceptional features!

FEATURES: High order of electrical and mechanical stability. Transmitter-type VFO that may be used as a crystal-locked oscillator. Constant tuning rate, no back-lash in tuning mechanism. Crystal-controlled 1st and 3rd oscillators. Selectable sidebands. Product detector for SSB/CW; envelope detector for AM. I.F.-type noise limiter. T-notch for up to 50 db. attenuation to unwanted heterodyne in I.F. pass band. Audio inverse feedback.

SENSITIVITY: Less than 1.0 uv on AM; less than 0.5 uv on SSB/CW.

SELECTIVITY: Variable in three steps, 0.5-2.5-5.0 kc.

CRYSTALS: Crystals provided for 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.5-29 Mc. Seven addt'l crystal pos. for 500 kc. segments between 85 kc. and 30 Mc. 100 kc. crystal calibrator included.

FRONT PANEL: R.F. Gain; Audio Gain; Tuning; Function Selector (U/L Sideband, AM, On/Off); Cal. Reset; Selectivity; Notch Freq.; BFO; ANL/CAL; Band Selector; Headset Jack; Preselector.

REAR CHASSIS: Coax. antenna connector; audio output; line fuse; ground lug.

PHYSICAL DATA: Size: 15″ x 7⅛″ x 13″. Net weight, 18 lbs. (Low freq. tuner available. See "accessories" page).

HT-44 TRANSMITTER

Companion unit for SX-117 Receiver. Provides transceive or separate transmit and receive. AM, CW and SSB operation. 80 through 10 meters, full band coverage, upper and lower sideband, (crystals for 28.0-28.5, 29.0-29.5, 29.5-30 Mc optional extra).

FEATURES: 200 watts, PEP input. Slave or independent operation—break in CW. Full VOX and push-to-talk. AALC. 52 OHM fixed pi network output. Carrier suppression 50 db.; unwanted sideband (500-2500 cps) 30 db. minimum. Third and fifth order distortion, 30 db. minimum. 5 kc. dial calibration.

FRONT PANEL CONTROLS: VFO Selector XMTR/RCVR. Audio Gain. Operation Off/Stand-by/Mox/Cal/VOX. Function CW/DSB/USB/LSB. Cal Reset. Tuning. Cal. Level. Band Selector. Driver Tune. Final Tune. RF Level.VOX Delay.

REAR CHASSIS: antenna, power socket, CW jack, control socket, jacks for transceive operation (using SX-117 VFO and crystal oscillator), internal/external OSC switch.

PHYSICAL DATA: Aluminum cabinet (15″W x 7⅛″H x 13″ deep) and chassis for light weight (16 lbs.).

Uses P-150 Power Supply (See "Accessories" page) and CA-44 cable assembly for interconnecting SX-117 and HT-44.

HT-41 LINEAR AMPLIFIER. NEW and POWERFUL! Here is the low cost linear amplifier you've been looking for—with the capabilities of delivering the "Big" signal on the air! Ideally engineered with conservatively rated components. Ideal companion for the HT-37 in both styling and price.



HT-41 HT-40 SX-140

Both units available in easily-assembled kit form.

FEATURES: Complete coverage 80 through 10 meters. Adjustable pi-network output. All important circuits metered. Built in R.F. output meter to simplify tune-up. Built in driver pad. Standby bias supply for complete cutoff during receive.

CIRCUIT DETAILS: This new high power linear amplifier employs two 7094 tetrode-type tubes. These tubes are connected as high Mu grounded grid triodes in Class B. Input circuit designed for 50 to 75 ohm exciters. A completely self-contained power supply uses 866A tubes connected in a full wave rectifier circuit possessing exceptional regulation. Provision also made to control cutoff bias by proper connections to terminal strip on rear of chassis. Overload protection provided by fuse which protects plate, filament, bias and blower circuits.

TUBES: (2) 7094; (2) 866A rectifiers.

FRONT PANEL CONTROLS: Filament switch; high voltage switch; meter switch; band selector; plate tuning; plate loading.

REAR CHASSIS: Co-ax input; co-ax output; AC line cord; plate, filament, bias and blower fuse; terminal strip for bias cutoff relay control and AC control circuits; terminal strip for internal input pad; grounding bolt and lug.

PHYSICAL DATA: 19¼″ wide x 9″ high x 15½″ deep. Cabinet is gray steel with brushed chrome trim. Shipping wt., 97 lbs.

HT-40 TRANSMITTER. Perfectly complements the high performance qualities of the SX-140 receiver. This crystal-controlled 75 watt transmitter has all the Hallicrafters design, quality and engineering features that are equally important to both beginners and old timers.

FEATURES: You get excellent AM performance as well as CW. Full band switching, 80 through 6 meters. Enjoy easy tune-up and crisp, clean styling that has efficient operation as well as appearance in mind. Unit is fully metered, TVI filtered.

SPECIFICATIONS: Maximum D.C. power input: 75 watts. Power output in excess of 35 watts CW, 30 watts peak AM phone. (Slightly less on 6 meters.) Frequencies: 80, 40, 20, 15, 10 and 6 meters.

TUBES AND FUNCTIONS: 6DQ5 power output; 6CX8 crystal oscillator and driver; 12AX7 speech amplifier; 6DE7 modulator; silicon high voltage rectifiers.

FRONT PANEL: Function (AC off, tune, standby, AM, CW); Band Selector (80, 40, 20, 15, 10, 6); Drive control; Plate tuning, plate loading, Crystal-VFO; Grid Current; Meter; AC indicator light; R.F. output.

REAR CHASSIS: Microphone gain; antenna co-ax connector; remote control terminals; AC power cord.

PHYSICAL DATA: Gray steel cabinet, 13⅜″ w. x 8⅛″ d. x 6⅝″ h. Ship. wt., 19 lbs.

SX-140 RECEIVER. It makes good operating sense to team up this quality-engineered receiver with the HT-40. In combination, these two units will give you an excellent performing station for a very modest investment.

FEATURES: You get complete coverage of all amateur bands 80 through 6 meters, with extremely high sensitivity and sharp selectivity. Unit has R.F. stage; S-meter; antenna trimmer; and crystal calibrator. Tuning ratio is 25 to 1.

CONTROLS: Tuning; Antenna Trimmer; Cal Reset; Function (AC off, standby, AM/CW/SSB); Band Selector; Cal on-off; R.F. Gain; Auto. Noise Limiter on-off; Selectivity/BFO; Audio Gain; phone jack; "S"-meter Adj.

TUBES AND FUNCTIONS: 6AZ8 tuned R.F. amplifier and crystal calibrator; 6U8 oscillator and mixer; 6BA6 1650 kc. I.F. amplifier and BFO; 6T8A 2nd detector, AVC, ANL and 1st audio; 6AW8A audio power amplifier and "S"-meter amplifier; (2) silicon high voltage rectifiers.

PHYSICAL DATA: Gray steel cabinet, 13⅜″ w. x 8⅛″ d. x 6⅝″ h. Ship. wt., 14 lbs.

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ACCESSORIES



HA-2

HA-2—HA-6 TRANSVERTERS. A sensible, new approach to VHF operation! Engineered with the usual Hallicrafters precision, these transverters will convert your present 10-meter station to VHF . . . AM, CW, SSB, RTTY, FM capability. All modes of transmission and reception on your present equipment are useable with these units. A nuvistor front end in the receiver section provides excellent sensitivity and noise figure.

FEATURES: Converts received VHF signals down to 10 meters for reception. Converts 10-meter signal to VHF for transmission. 5894 tube in transmitter final amplifier can be driven up to 120 watts input. Can be driven by exciters with 10 to 100 watt capability. Built-in coaxial antenna relay.

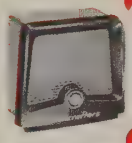
FRONT PANEL CONTROLS AND FUNCTIONS: Power on-off, range selector; tuning; loading; output indicator; plate current meter.

TUBES: 12AT7 crystal oscillator; 6AH6 buffer amplifier; 6CW4 R.F. amplifier (REC.); 6AN4 mixer (REC.); 12BY7 mixer (Xmit); 6360 driver (Xmit); 5894 final amplifier.

REAR CHASSIS CONTROLS AND FUNCTIONS: Receiver co-ax.; antenna co-ax fitting; transmitter co-ax. input hi.; transmitter co-ax. input low; power and control socket; bias adjust, filament and relay fuse; hi-voltage connector.

POWER REQUIRED: 750 volts @ 160 MA; 250 volts @ 70 MA; minus 60 volts @ 10 MA.

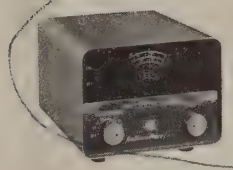
PHYSICAL DATA: 8″ high x 17″ wide x 8⅞″ deep. Gray steel cabinet with silver trim.



R-47 SPEAKER. Compact, lightweight, designed for communications. Flat response from 300-2850 c.p.s. Input impedance: 3.2 ohms.



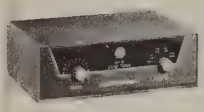
R-48A SPEAKER. Designed for use with SX-122, or any receiver with 3.2 ohm output. Heavy magnet for exceptional damping, minimum distortion. Music/voice switch.



HA-5 DELUXE VFO. Heterodyne-type, all amateur bands. Crystals for 80-10M furnished; we can supply 6 or 2M crystals. 30-1 tuning ratio. Illum. dial, built-in spotting switch.

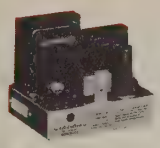


HA-1 "T.O." KEYER. Meets all requirements of the CW perfectionist. Employs digital techniques to produce constant ratio of dot-to-space-to-dash throughout entire speed range. Transformer operated. Speeds from 10-65 WPM. Monitor or sidetone may be heard through built-in speaker.

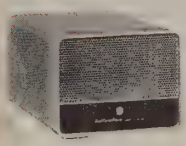


HA-10 LOW FREQ. TUNER. For use with SX-117 triple-conversion receiver. Covers 85 kc. to 3.0 Mc. Terminal for ext. antenna. Coaxial cable with connector plugs into receiver L.F. input.

POWER SUPPLIES



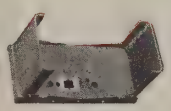
P-26. For use with HA-2 or HA-6 transverters. Supplies all voltages. Only one required for stations using both units.



P-150AC. Use with SR-150, SR-160 transceivers at base, and HT-44. Styled to match SR-150 and SR-160. 5 silicon diode rectifiers, PM speaker.

P-150DC (not illust.) for mobile use. Transistorized, weighs only 5½ lbs.

P-45. For use with HT-45 Amplifier. Supplies necessary voltage for operation of the unit.



MR-150 MOUNTING RACK. Universal rack for mounting SR-150 on transmission hump, floor or dashboard. Quick-release design — all connections made simultaneously. Access holes for VOX controls.



HA-8 "SPLATTER GUARD." Electronic modulation indicator, reduces splatter tendency due to excessive audio gain. Transformer operated, AC power. Complete with R.F. probe and connecting cable.

CA-44 CABLE ASSEMBLY. For use with HT-44 — SX-177 for transceive operation.

HA-7 100 kc CRYSTAL CALIBRATOR ASSEMBLY. Plugs into SX-122.

HA-16 VOX ACCESSORY.
For use with SR-160

MR-160 MOBILE INSTALLATION KIT.
For use with SR-160.

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COMMUNICATIONS EQUIPMENT

QUALITY AND RELIABILITY IN COMMUNICATIONS...

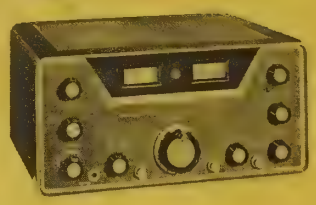
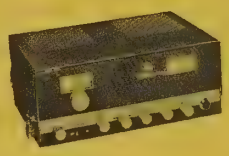
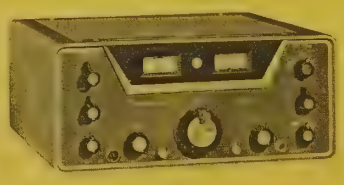


Effective November 1, 1964

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FIFTH & KOSTNER AVENUES · CHICAGO 24, ILLINOIS

Model		Description	Price
SX-117 (Less Speaker)		Triple conversion SSB/CW/AM receiver. Can tune most frequencies, 85 kc through 30 mc, by insertion of proper crystal and use of HA-10 (low frequency tuner) below 3 mc. Product detector for SSB/CW. Envelope detector for AM. Crystal calibrator. "T" notch hetrodyne rejection. VFO can be used as crystal locked oscillator. Thirteen tubes plus diode rectifiers. Use R-47 or R-48A speaker. Size 15"x7 1/8"x13". Shipping weight 21 lbs. Shipped with crystals for 80-40-20-15 meter amateur bands plus 28.5-29 mc coverage on 19 meters. (Certified for FCDA matching funds. OCDM Item #R-16, R-16SSB.)	**$379.95**
SX-122 (Less Speaker)		9 Tubes plus 1 diode and rectifier. Dual conversion. Upper or lower side band selectable. Power output 1.0 w with 10% or less distortion. Provision for HA-7. Dimensions: (WHD) 19" x 8" x 10". Weight: 29 lbs.	**$295.00**
SX-140 (Less Speaker) SX-140K (Kit)		CW/AM/SSB Receiver. Complete coverage 80, 40, 20, 15, 10 and 6 meter bands. Highly sensitive and selective, low cost ham band only receiver. S-meter. Antenna trimmer. ANL. Slide rule dial. Switching circuits for xmitter and antenna changeover control. Gray steel cabinet (matches HT-40). 13 3/8"x8 1/8"x6 5/8". Shipping wt. 14 lbs.	**$139.95** WIRED **$114.95** KIT
SR-42 SR-46		2 meter transceiver. Receiver double conversion super heterodyne with quartz crystal controlled 2nd oscillator. Contains "S" meter, ANL and zener diode regulated HF oscillator. Transmitter crystal, controlled. Up to four quartz crystals may be switch selected from front panel. Fifth position is provided for external V.F.O. Lift-up top cover gives access to crystal sockets, tubes and internal adjustments. Two way built-in power supply 115 V. A.C., 12 V. D.C. operation (Vibrator, D.C. power cord and mobile mounting bracket not included). Dimensions: 5 1/2" H x 12 1/8" W x 8 1/4" D. Shipping weight 17 lbs. Same as SR-42 except for 6 meters.	**$189.95** **$189.95**
SR-150		80 through 10 meter amateur transceiver. Each band covers 500 kc for fixed/portable/mobile operation on SSB/CW. 150 watt pep input on SSB. 125 watts on CW Crystal filter type sideband generation—carrier type CW operation. Amplified automatic level control (AALC), RIT control allows independant tuning of receiver plus or minus 2 kc of transmit frequency. Receiver sensitivity less than 1 microvolt. Audio passband 2.8 kc. If shape factor 2 to1. Eighteen tubes plus 10 diodes and 1 varicap. Aluminum construction (Certified for FCDA matching funds. OCDM Item #R-16.) Size 15"x6 1/2"x13". Shipping weight 17 1/2 lbs.	**$650.00**
SR-160		Tri-band SSB/CW transceiver. 20m USB, 40-80m LSB. Has RIT and AALC. Quartz crystal filter. Final is a pair of 12DQ6's. Uses P-150 AC and P-150 DC. Dimensions: (WHD) 13"x6 1/2"x11".	**$349.50**
MR-40		Mounting kit for SR-42 and SR-46.	**$11.50**
MR-150		Mobile mounting rack for SR-150. Shipping weight 12 3/4 lbs.	**$39.95**
MR-160		Mobile installation kit for SR-160.	**$14.95**
P-45 AC		Supplies all necessary voltages to the HT-45. Dimensions: (WHD) 12" x 14" x 9 3/4". Weight: 75 lbs.	**$225.00**
P-150 AC		AC power supply and loudspeaker for SR-150, SR-160 and HT-44. Dimensions (WHD) 6 1/4" x 7 1/2" x 10". Shipping weight 28 1/2 lbs.	**$99.50**
P-150 DC		DC power supply for SR-150 and SR-160. Dimensions (WHD) 3 3/4" x 10" x 6 1/2". Shipping weight 10 lbs.	**$109.50**

12.9GAL CLR HI-TOP BOX

$9.99

WHITE

LIST: 13.99

No. 915-979

SIGNID: 915-979 SIZECODE: E STOREID: 180 A/BN: 1206 22 Sep 1999

HANDICRAFTS

12.9GAL CLR HI-TOP BOX

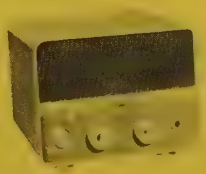
$9.99

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LIST: 13.99

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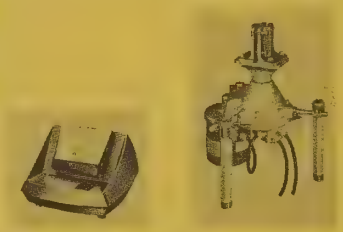
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Model		Description	Price
R-47		Matching 4" Speaker for Hallicrafters SX-110, SX-115, SX-117 and SX-140. Essentially flat frequency response over a range of 300 to 2850 C.P.S. with a very rapid drop in output above and below the cutoff points. The unit is designed for speech and c.w. reproduction only and is extremely effective on S.S.B. Input impedance 3.2 ohms. Size 5½"x5¼"x3½". Shipping weight approximately 2½ lbs.	$12.95
R-48A		Matching 5½"x7½" speaker for any Hallicrafters or other receiver having a 3.2 ohm output. 3.16 oz. magnet produces a full saturated air gap and distortion-free reproduction. A fidelity switch permits selection of full fidelity response or voice frequency for communications reception. For use with SX-62A, SX-110, SX-115, SX-117, SX-122 and SX-140. Gray steel cabinet. 6¾"x13¼"x8¼" Shipping weight 9 lbs.	$19.95
R-49		Mobile speaker.	$14.95
HT-40 HT-40K (KIT)		AM/CW output on 80, 40, 20, 15, 10, and 6 Meter Bands. Full 75-watts input, 80 thru 10 (slightly less on 6 meters). TVI filtered PI-net output. Excellent low distortion modulation. Gray steel cabinet. 13⅜"x8⅛"x6⅜" Shipping wt. 19 lbs.	$109.95 WIRED $89.95 KIT
HT-44		Phasing type AM/CW/SSB transmitter. Operates transceive or independent with SX-117 receiver. 80 through 10 meter coverage. Final is a pair of 6DQ5's. Requires P-150 AC power supply. Dimensions: (WHD) 15"x7⅛"x13".	$395.00
CA-44		HT-44—SX-117 transceive interconnecting cable.	$4.95
HT-45		Linear Amplifier: Full legal input. Uses a 3-400Z Hi-Mu triode in a cathode driven, grounded grid circuit. 50 ohms impedance; requires nominal 40 watts driving power. 80-10 meter coverage. Uses P-45 power supply. Dimensions: (WHD) 15" x 7" x 13". Weight: 28 lbs.	$365.00
A-1 .O. KEYER"		HA-1 Electronic Keyer. Employs digital techniques. Features constant ratio of dot-to-space-to-dash over the entire speed range. All timing circuits are electronic. Dots and dashes are self-completing. Transformer operated. Vacuum-sealed, mercury wetted relay is used only to key the transmitter and side tone signal. Speed is adjustable from 10 to 65 W.P.M. Shipping weight 9 lbs. Size 7"x5¾"x7".	$79.95
HA-5		HA-5 V.F.O. Designed for extreme stability and versatility. Deluxe self-powered hetrodyne type V.F.O. Calibrated all bands 80 through 2 meters. Output frequencies 3.5 to 4.0 Mc - 7.0 to 7.5 Mc. 7.8 to 8.3 Mc and 8.333 Mc to 8.833 Mc. (Crystals not supplied for 6 and 2 meters.) Shipping weight 8 lbs. Size 7"x5"x8½".	$79.95
HA-7		100 kc plug in crystal calibrator for the SX-122.	$19.95

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COMMUNICATIONS EQUIPMENT

Model		Description	Price
HA-8		Modulation indicator. An AC operated electronic modulation indicating device. Complete with RF probe and interconnecting cable. Size 7½"x2⅝"x5¾". Shipping weight 5½ lbs.	**$24.95**
HA-10		Low-frequency tuner. For use with Model SX-117. To cover 85 kc through 3 Mc ranges. Size 7½"x2⅝"x5¾". Shipping weight 4¼ lbs.	**$24.95**
HA-16		VOX adapter for the SR-160.	**$37.95**
HA-32		Heavy duty rotator supports and rotates large arrays. Continuous rotation. 50 ohm impedance (less than 1.1:1 thru 100 Mc). Dual worm gear drive. ⅛ hp motor. 1-1/16 RPM rotation speed. 250 lb. thrust load. 12,000 in./lb. radical load. 1200 in./lb. torque. Power required 115 V. 60 cycles 3.9A. Supplied with clamps and brackets for triangular tower mounting. Other mounting fixtures for poles, etc. available from factory. Control head dimensions 5" H x 8" W x 6" D. Shipping weight 43 lbs.	**$225.00**

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE

PRINTED IN U.



5R40

RUN 1

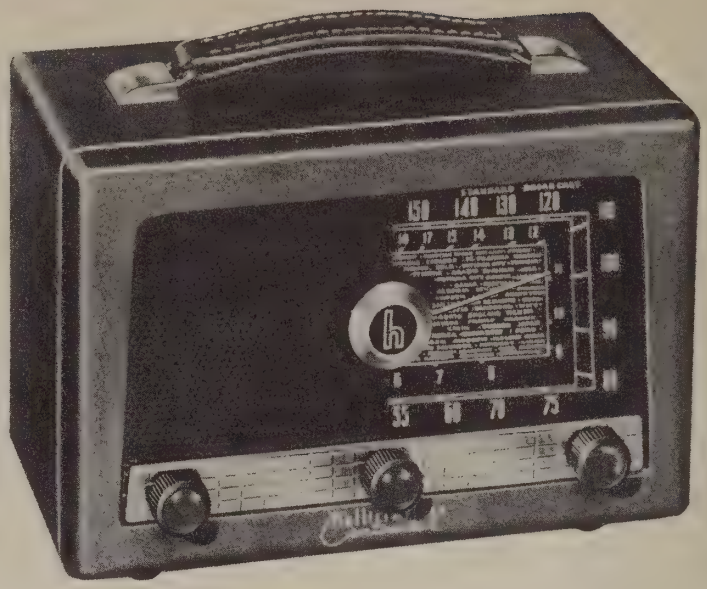
the hallicrafters co.

MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

Your Hallicrafters 5R40 portable radio tunes the full standard broadcast band and the shortwave range from 5.8 to 18.3 megacycles to bring you outstanding world-wide radio reception. It is a 4 tube superheterodyne radio and will operate on batteries or 105 to 125 volt AC/DC current. It uses a selenium rectifier which makes instantaneous playing possible on AC or DC as well as batteries.

Your receiver contains a sensitive built-in antenna for standard broadcast reception which eliminates the need for an external antenna. A separate external antenna is required, however, for shortwave reception. In most localities, good results can be obtained with the 15 foot antenna wire included with your receiver. It is merely necessary to uncoil the wire, connect one end of it to terminal A on the back of the set and then run it about the room in any convenient manner.



Hallicrafters Model 5R40

For your convenience, the principal shortwave stations of the world have been clearly marked on the dial. Since shortwave reception conditions vary with the season of the year and even with the time of day, shortwave programs may not be heard with the same regularity as standard broadcasts. To aid you in determining the most favorable times for shortwave listening, a special table has been provided below.

BEST SHORTWAVE RECEPTION TABLE

Band	Most Favorable Time	Most Favorable Distance
6-7 MC	Night - Winter	Day - 400 miles Night - Over 1500 Miles
9-10 MC	Day - Late Afternoon and Night - Winter	Over 500 miles
11-12 MC	Evenings or Late Summer Afternoons	Day - Under 1500 Miles Night - Over 1500 Miles
15-18 MC	Early Mornings and Summer Evenings	Over 1500 Miles

INSTALLATION INSTRUCTIONS

STANDARD BROADCAST ANTENNA - The sensitive built-in antenna in your receiver eliminates the need for an external antenna for standard broadcast reception.

SHORT WAVE ANTENNA - Two terminals are provided on the back of the set for the shortwave antenna and ground connections. Good results can be obtained in most localities with the 15 foot antenna wire included with your receiver. Simply uncoil the wire, connect one end of it to terminal A and run it about the room in a convenient manner. An outside antenna 30 to 60 feet long (ordinary copper wire) may be necessary if the receiver is to be operated in a difficult reception area or steel constructed building. In some locations, reception may be improved by connecting a wire lead from terminal G to a cold water pipe or outside ground rod.

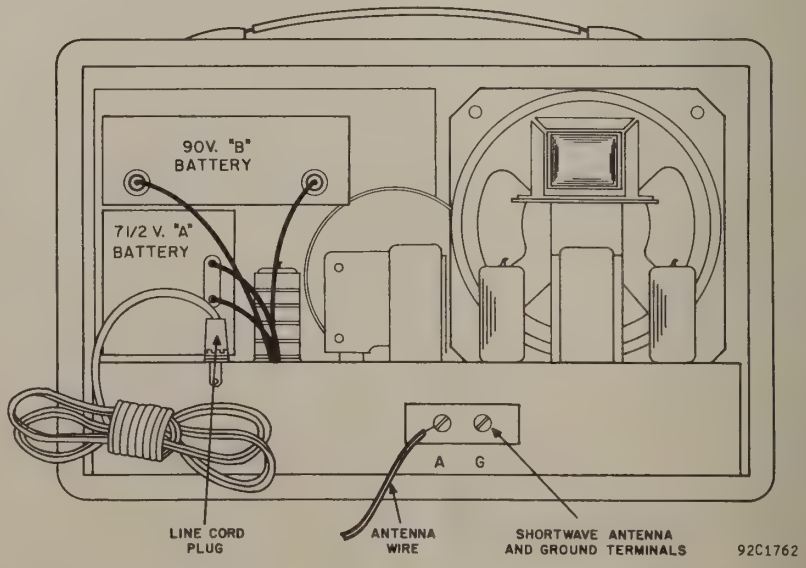


Fig. 1. Rear View of Receiver with Cabinet Back Removed

OPERATING INSTRUCTIONS

BATTERY OPERATION

1. Remove the cabinet back by unfastening the leather strap and pulling outward at the top of the cabinet back.
2. Select the required batteries from the battery replacement list on page 4.
3. Place the batteries into the compartment at the left side of the cabinet and insert the battery connectors into the receptacles provided on the batteries.
4. Insert the LINE CORD PLUG into the CHASSIS RECEPTACLE on the top left of the chassis (see Fig. 1).

AC/DC OPERATION (105-125 Volts DC or 50/60 Cycles AC)

1. Insert the line cord plug into a convenient power outlet.
2. When operating on DC, reverse the line cord plug if the radio does not operate after having been turned ON. On DC, the set will operate ONLY with the plug in one position.

TUNING DIAL

1. The outer dial scale is the standard broadcast band and is calibrated in kilocycles, minus the last zero. To convert the dial reading to kilocycles simply add one zero.
2. The inner dial scale is the shortwave portion of the dial and is calibrated directly in megacycles.

TUNING

1. Set the BC-SW knob to BC for standard broadcast reception or to SW for shortwave reception.
2. Turn the set on by rotating the OFF-VOLUME knob clockwise.
3. Turn the TUNING knob slowly to the desired station and readjust the OFF-VOLUME knob for the desired volume.

   NOTE - The built-in antenna provided for standard broadcast reception is directional. If satisfactory reception of a standard broadcast station is not obtained, rotate the entire receiver for the position which will provide the greatest signal.
4. To turn the set off, rotate the OFF-VOLUME knob counterclockwise until a click is heard.

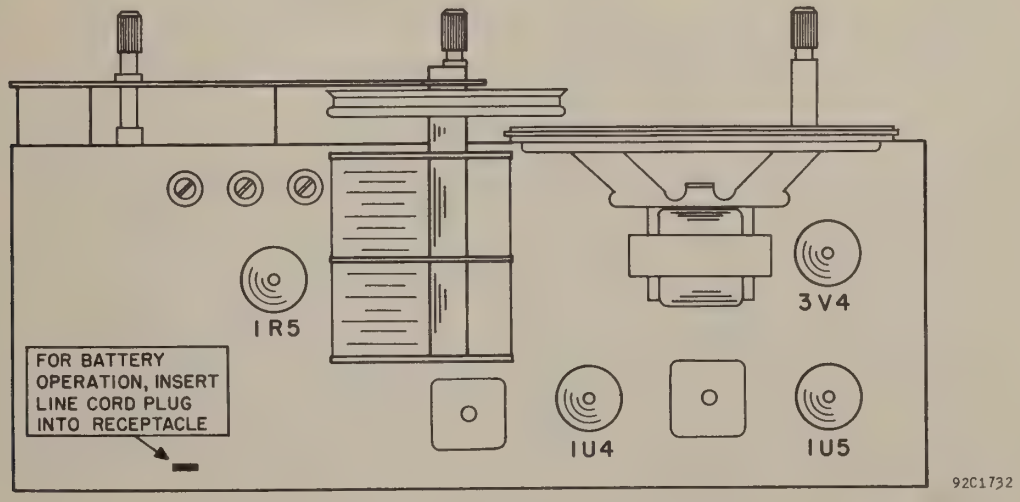


Fig. 2. Top View of Chassis Showing Tube Location

SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of your receiver, contact your dealer. Make no service shipments to the factory. The Hallicrafters Company maintains an extensive system of authorized factory service centers where any required service can be performed promptly and efficiently at a nominal charge. The sign shown at the right is displayed by all authorized service centers.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

Authorized hallicrafters Service Center radio

94X1401-R

SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes and Rectifiers . . 4 tubes and 1 selenium rectifier
Power Supply . . 105-125 volts DC/50-60 cycle AC or 90 and $7\frac{1}{2}$ volt batteries
Frequency Coverage. . . BC - 535 to 1620 KC
SW - 5.8 to 18.3 MC
Intermediate Frequency . . . . . 455 KC
Speaker . . . . . 4-inch PM
Voice Coil Impedance . . . . . 3.2 ohms
Antenna BC - Built-in stick loop
SW - Terminals for single wire or doublet

REPLACEMENT BATTERIES

$7\frac{1}{2}$ Volt "A" - RCA VS065, Burgess C5, Eveready 717, Ray-O-Vac P751

90 Volt "B" - RCA VS090, Burgess N60, Eveready 490, Ray-O-Vac 4390

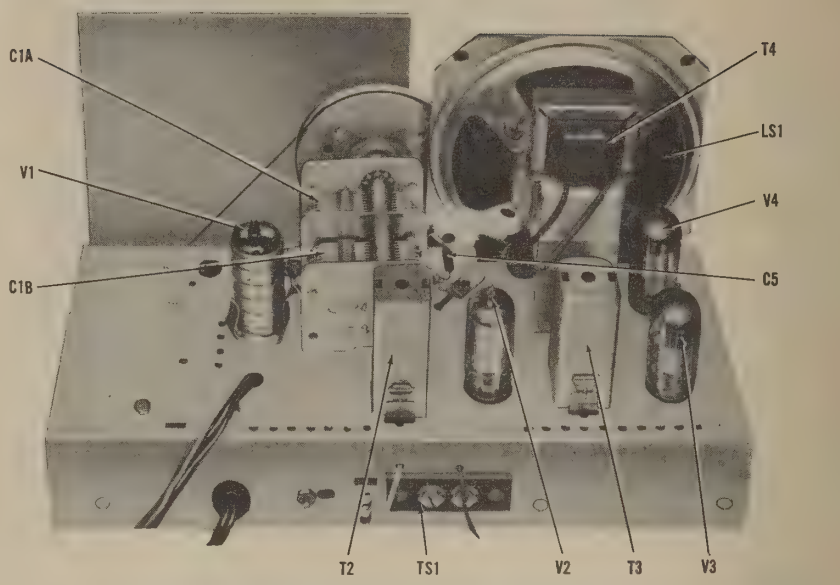


Fig. 3. Top View of Chassis Showing Component Location

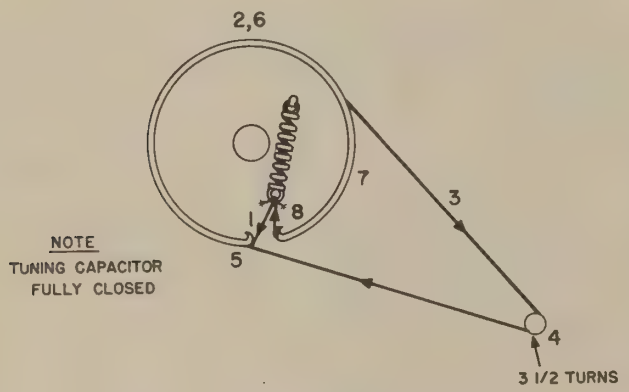


Fig. 4. Dial Cord Stringing Diagram

DIAL CORD STRINGING - Set the tuning capacitor in a fully meshed position. Tie one end of a 30-inch length of 30 lb. test dial cord to the tension spring at position 1 as shown in Fig. 4. Follow the stringing procedure 1 through 8. At position 8, stretch the spring and tie the cord securely to the spring. Cut off the loose ends of the cord and apply a drop of quick drying cement to the knot. With the tuning capacitor fully meshed, align the pointer so that it points vertically downward.

ALIGNMENT PROCEDURE

- Connect output meter across voice coil.
- Set volume control at maximum.
- Use a non-metallic alignment tool.
- Stick loop antenna must be connected.
- Refer to Fig. 5 for location of alignment adjustments.
- Generator must have modulated output and cover 455 KC, 600 KC, 1400 KC and 14 MC.
- To avoid AGC action, use lowest output setting of signal generator that gives satisfactory reading on meter.

Step	Signal Generator Connections	Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust for Maximum Output
1	High side thru .01 mfd capacitor to green lead of stick loop antenna. Low side to white lead or chassis.	455 KC	BC	1000 KC	A and B (2nd IF) C and D (1st IF)
2	High side thru 300 ohm carbon resistor to terminal A on back of set. Low side to G.	14 MC	SW	14 MC	E (SW osc. trimmer) F (SW ant. trimmer)
3	Place generator lead close to stick loop antenna. No actual connection.	1400 KC	BC	1400 KC	G (BC osc. trimmer) H (BC ant. trimmer)
4	Same as Step 3.	600 KC	BC	600 KC	J (BC osc. padder)

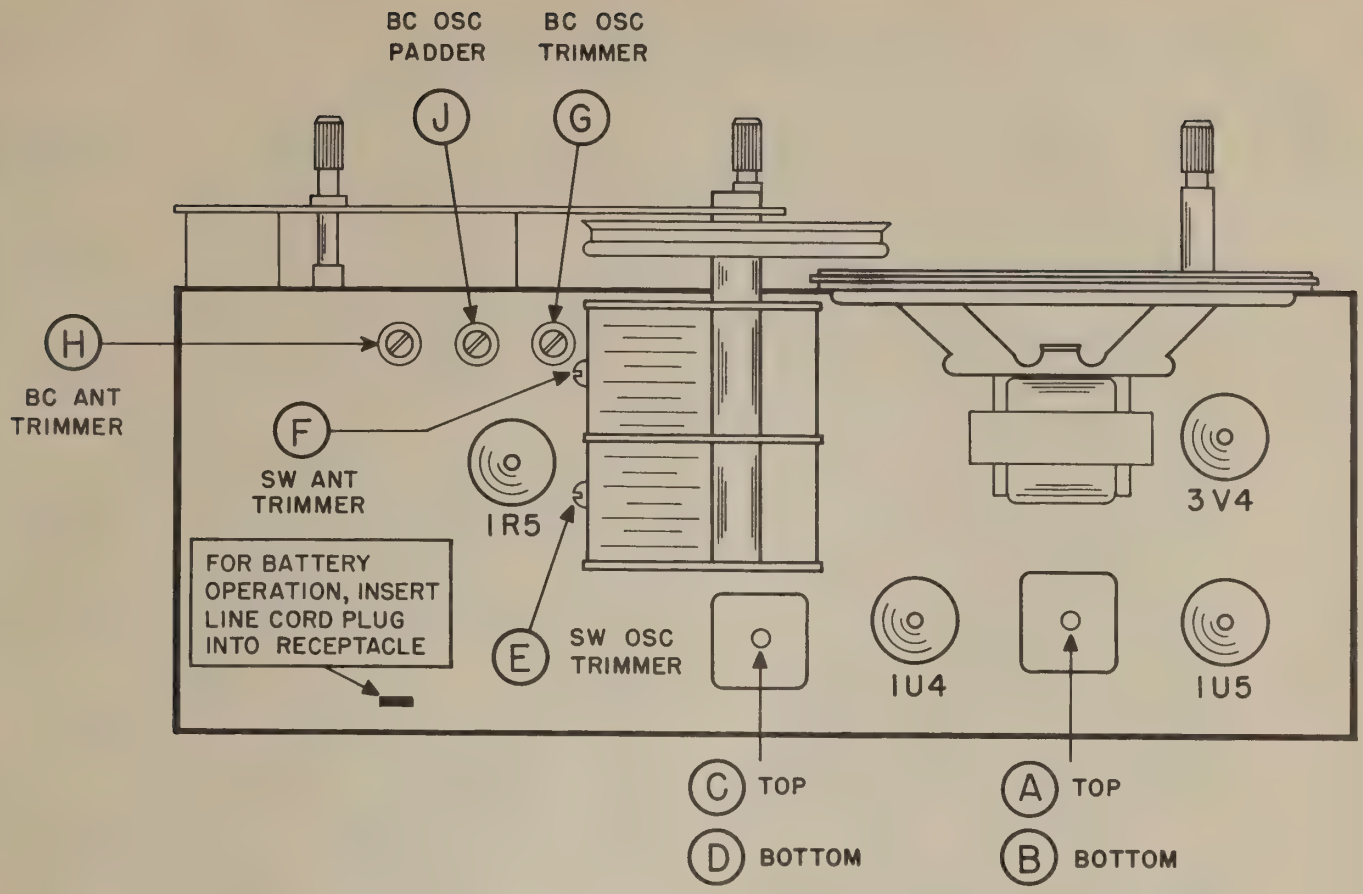


Fig. 5. Top View of Chassis Showing Location of Alignment Adjustments

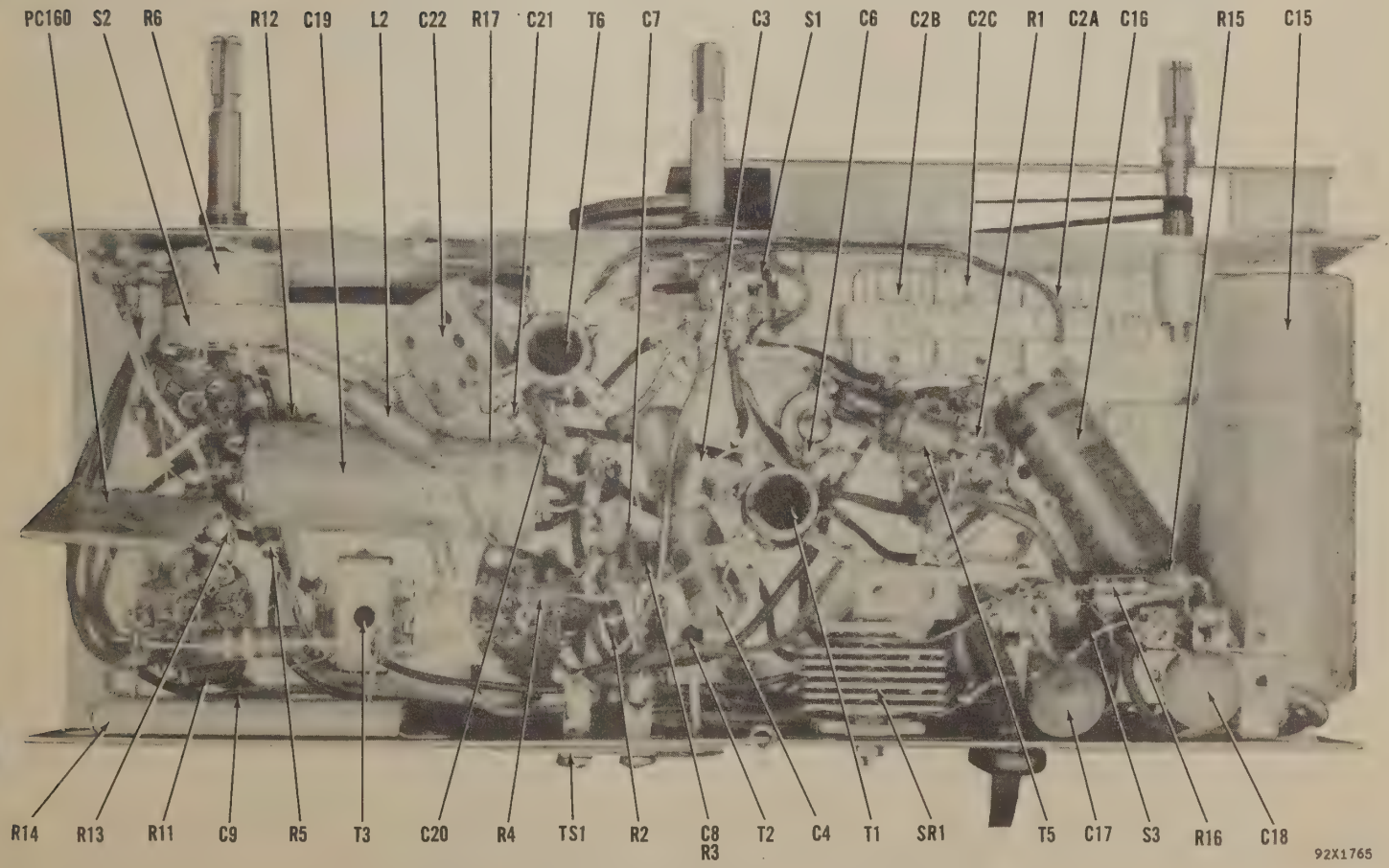


Fig. 6. Bottom View of Chassis Showing Component Location

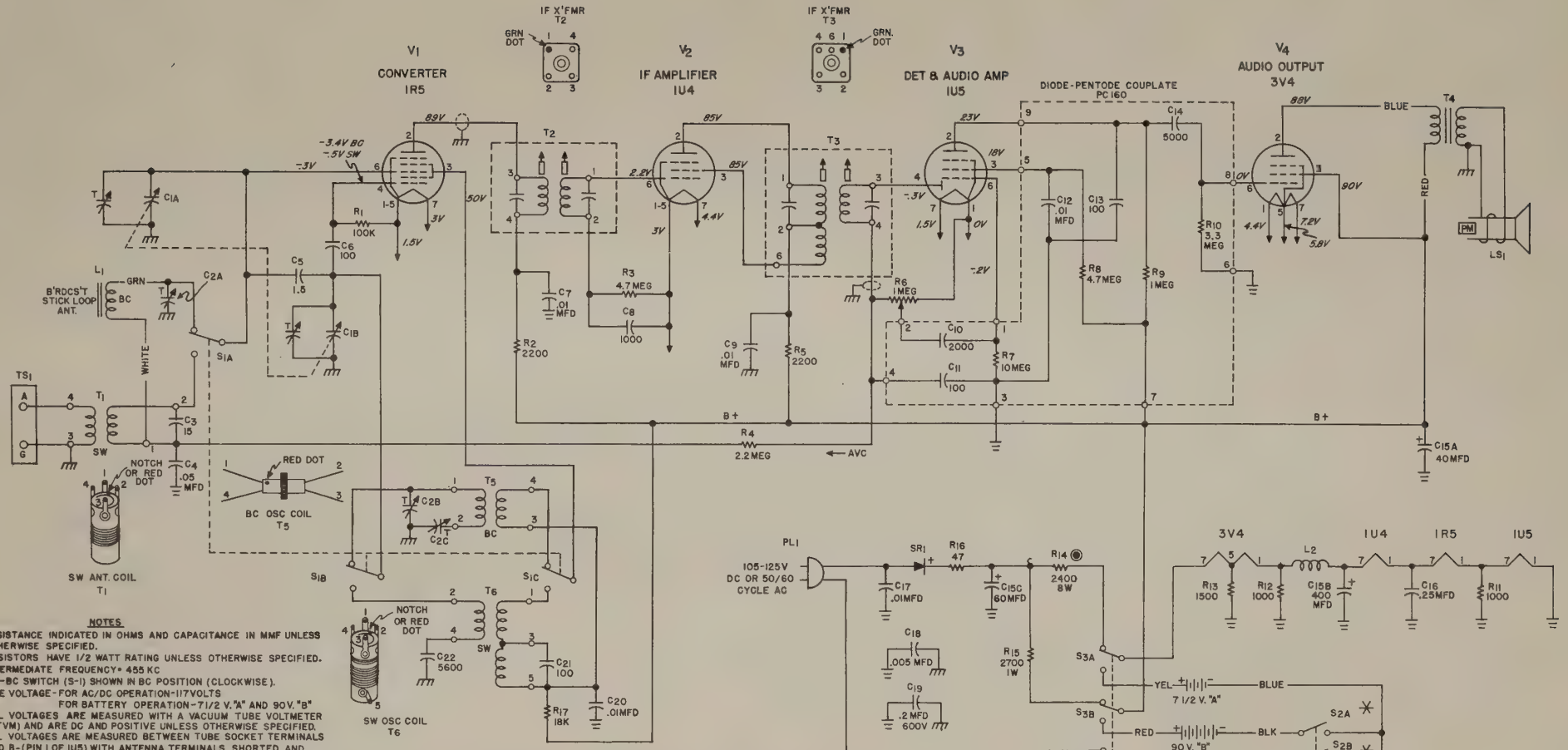
SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1A & B	Tuning capacitor; 2 section	48C294
C-2A, B & C	Trimmer assembly; 3 section	44C419
C-3	15 mmf. 500V., ceramic	47X20UK150K
C-4	.05 mfd. 200V., tubular paper	46AW503J
C-5	1.5 mmf. bakelite gimmick	47A160-3
C-6,21	100 mmf. 500V., ceramic	47X25UK101K
C-7,9,17, 20	.01 mfd. 500V., ceramic disc	47A217
C-8	1000 mmf. 500V., ceramic	47B20A102M5
*C-10	2000 mmf., ceramic	- - - - -
*C-11	100 mmf., ceramic	- - - - -
*C-12	.01 mfd., ceramic	- - - - -
*C-13	100 mmf., ceramic	- - - - -
*C-14	5000 mmf., ceramic	- - - - -
C-15A, B & C	Capacitor, electrolytic; triple section; 40 mfd. 150V., 400 mfd. 15V., 60 mfd. 150V.	45B206
C-16	.25 mfd. 200V., tubular paper	46AT254J
C-18	.005 mfd. 500V., ceramic disc	47A168
C-19	.2 mfd. 600V., tubular paper	46AX204H
C-22	5600 mmf. 500V., mica	47X35B562K
	RESISTORS	
R-1	100,000 ohms ½ watt, carbon	23X20X104K
R-2,5	2200 ohms ½ watt, carbon	23X20X222K
R-3	4.7 megohms ½ watt, carbon	23X20X475K
R-4	2.2 megohms ½ watt, carbon	23X20X225K
R-6	Volume control; 1 megohm; includes on-off switch S-2	25B1005
*R-7	10 megohms, ½ watt	- - - - -
*R-8	4.7 megohms, ½ watt	- - - - -
*R-9	1 megohm, ½ watt	- - - - -
*R-10	3.3 megohms, ½ watt	- - - - -
R-11,12	1000 ohms ½ watt, carbon	23X20X102K
R-13	1500 ohms ½ watt, carbon	23X20X152K
R-14	2400 ohms 8 watts, wirewound	24B938
R-15	2700 ohms 1 watt, carbon	23X30X272K
R-16	47 ohms ½ watt, carbon	23X20X470K
R-17	18,000 ohms ½ watt, carbon	23X20X183K
	COILS AND TRANSFORMERS	
L-1	Antenna, stick loop; for broadcast band	57B167
L-2	Choke, RF	53A008
T-1	Coil, antenna; SW	51B1535
T-2	Transformer, 1st IF	50C233
T-3	Transformer, 2nd IF	50C516
T-4	Transformer, audio output; part of speaker LS-1	- - - - -
T-5	Coil, oscillator; BC	51B1534
T-6	Coil, oscillator; SW	51B1543

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1A, B & C	Switch, rotary; BC-SW	60B487
S-2A & B	Switch, on-off; part of volume control R-6	- - - - -
S-3A, B & C	Switch, battery change-over	60B502
	PLUGS AND SOCKETS	
	Plug assembly, "A" battery; includes leads	87A1971
	Plug assembly, "B" battery; female (includes lead)	87A3508
	Plug assembly, "B" battery; male (includes lead)	87A3593
	Socket, tube; miniature 7 pin	6B404
	TUBES AND RECTIFIERS	
V-1	1R5: converter	90X1R5
V-2	1U4: IF amplifier	90X1U4
V-3	1U5: detector, AVC and audio amplifier	90X1U5
V-4	3V4: audio output	90X3V4
SR-1	Selenium rectifier, 75 ma.	27A172
	MISCELLANEOUS PARTS	
	Cabinet; does not include front panel assembly	78F854
	Cabinet front panel assembly	7D379
	Clip, mtg.; for SW osc. coil T-6	76A326
	Clip, mtg.; for SW ant. coil T-1	76A868
	Clip, mtg.; for IF transformers T-2 and T-3	76A385
PC-160	Couplate, diode-pentode; consists of C-10, 11, 12, 13 and 14 and R-7,8,9 and 10. (see schematic)	49C022
	Dial cord (30" length needed)	38A026
	Dial scale	83D418
	Grommet, rubber (gang mounting)	16A128
	Knob, BC-SW	15B525
	Knob, OFF-VOL	15B529
	Knob, TUNING	15B526
	Line cord and plug PL-1	87A3592
	Lock, line cord	76A974
	Pointer, dial	82A220
LS-1	Speaker, 4-inch PM; includes audio output transformer T-4 and mounting bracket	85C129
	Spring, dial cord tension	75A012
TS-1	Terminal board, SW antenna	88B809

* Part of diode-pentode couplate PC-160.

MODEL 5R40
RUN 1



NOTES

1. RESISTANCE INDICATED IN OHMS AND CAPACITANCE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTORS HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. INTERMEDIATE FREQUENCY= 455 KC
4. SW-BC SWITCH (S-1) SHOWN IN BC POSITION (CLOCKWISE).
5. LINE VOLTAGE- FOR AC/DC OPERATION-117VOLTS
   FOR BATTERY OPERATION-7 1/2 V."A" AND 90V."B"
6. ALL VOLTAGES ARE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM) AND ARE DC AND POSITIVE UNLESS OTHERWISE SPECIFIED.
7. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND B-(PIN 1 OF 1U5) WITH ANTENNA TERMINALS SHORTED AND TUNING GANG FULLY MESHED.
8. K=1000

◉ IN SOME SETS, R-14 IS REPLACED BY (1) 2700 OHM 8 WATT. WW RESISTOR AND (1) 22K OHM 1 WATT RESISTOR CONNECTED IN PARALLEL.

✳ PART OF VOLUME CONTROL R6.

⏚ B- (COMMON GROUND)

⏚ CHASSIS

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89E422-A

Warranty

"This product is warranted to be free from defective material or parts, and it is agreed to furnish a new part in exchange for any part of this unit which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to the authorized radio dealer or wholesaler from whom purchased, intact, for examination with all transportation charges prepaid, within ninety days from the date of sale to original purchaser and provided that such examination discloses that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our authorized facilities, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

94 X 561

the Hallicrafters co.

BOOK NO. 94X911
352 - RUN 1

hallicrafters

littlefone

2-WAY FM RADIO-TELEPHONE 25-50 MC

OPERATING and SERVICE INSTRUCTIONS

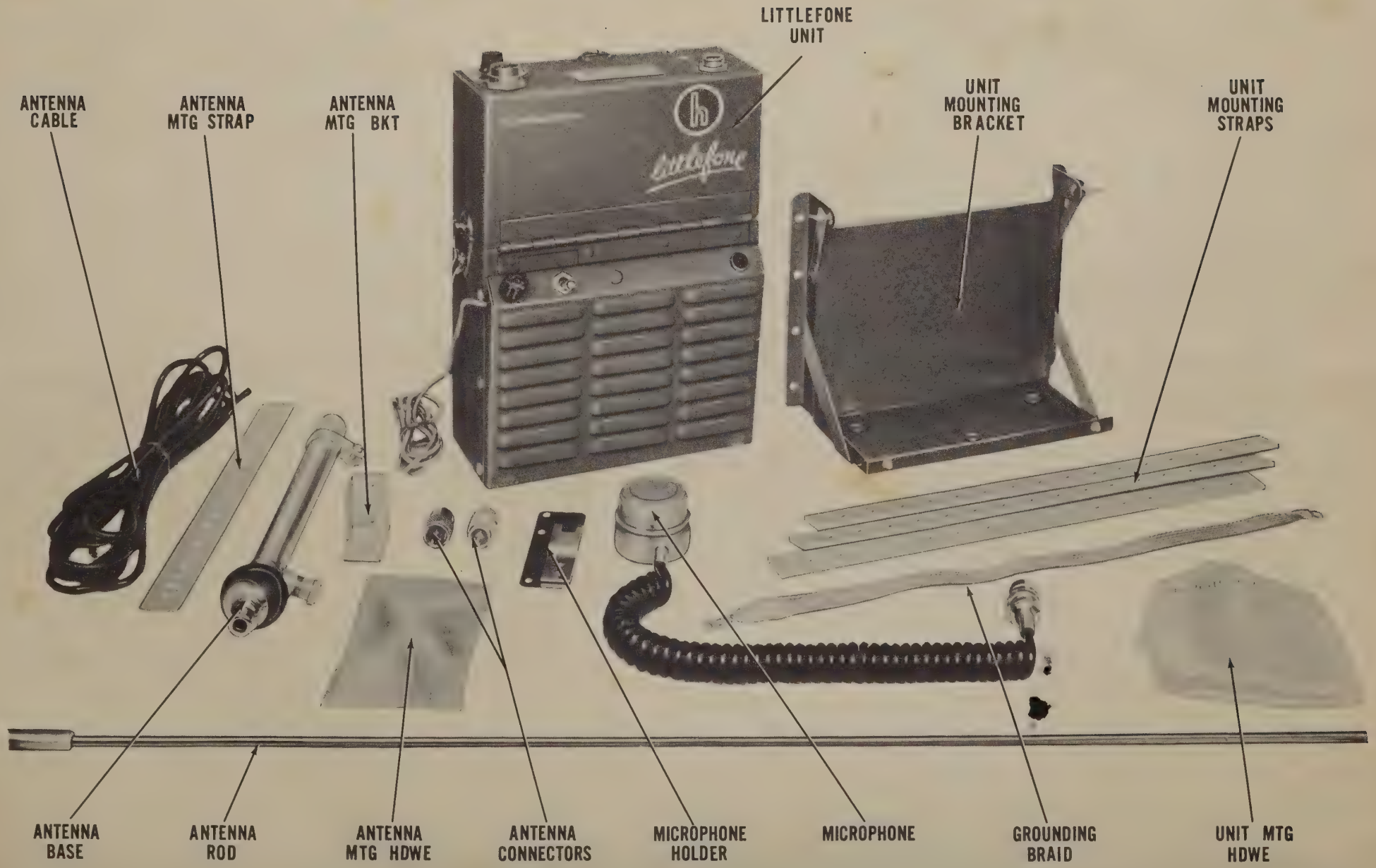
HT-25

RUN 1

the hallicrafters co.

MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

"LITTLEFONE" MOBILE UNIT
MODEL HT-25



GENERAL DESCRIPTION

The HT-25 "Littlefone" is a completely self-contained 2-way FM radiotelephone for use in mobile vehicles equipped with 6 or 12 volt electrical systems. It operates on a single fixed frequency in the 25 to 50 MC range and has a radio-frequency power output of 2.0 watts. The unit is designed primarily for use with "Littlefone" portable and central station equipment or for communication with other mobile units, but may also be tied in with existing higher powered FM equipment. The unit comes fully equipped with a whip antenna (complete with cable and connectors), hand microphone, built-in 4-inch PM speaker, mounting bracket, and necessary mounting hardware. Provisions are also included for connecting a remote speaker.

The FM transmitter and receiver are contained on a common chassis located in the upper section of the case while the audio output circuit and vibrator power supply are contained on a second chassis located in the lower section. All electrical connections between the two chassis are made with plugs and sockets, and each chassis is easily removable for service. A built-in squelch circuit quiets the receiver when no signals are being received. This feature plus the fact that an FM system is being employed assures virtually noise-free reception.

Where a tunable stationary receiving station is desired, use the economical Hallicrafters Model S-82 Receiver which tunes from 30 to 50 megacycles.

IMPORTANT

It is the requirement of the Federal Communications Commission that this radio equipment be licensed. The appropriate license application form (F.C.C. Form 400) can be obtained upon request from the Federal Communications Commission, Washington 25, D.C. or your local F.C.C. field office. All Littlefone equipment is on the Commission's "List of Equipments Acceptable for Licensing". The technical information requested in sections 1(d) and 1(e) of Form 400 should be filled out as follows: Emission - F3; Maximum permissible power input - 3.0 watts. Form 400 should be submitted to the Federal Communications Commission, Washington 25, D. C.

STANDARD EQUIPMENT SUPPLIED WITH UNIT

1. Transmitter, receiver, and power supply in weather-resistant metal case. Complete with tubes, crystals, and vibrator.
2. Mounting bracket for mounting case to dash, floor, or other convenient operating location.
3. Installation mounting straps (3)
4. Installation mounting hardware (packed in cloth bag)
5. Hand microphone
6. Microphone holder for case or dash mounting.
7. 18" Flexible braid for grounding case to vehicle.
8. Antenna, 10 feet of RG-58/U cable (with connectors), and mounting hardware.

ACCESSORIES

Order parts by Hallicrafters Part Number and Description

Description	Hallicrafters Part Number	Cross Reference
Telephone handset, complete with cord and plug.	41X18708. . . .	P-4197
Holder for telephone handset	41X23023. . . .	----------

INSTALLATION INSTRUCTIONS

LOCATION AND MOUNTING - The unit may be mounted under the dash, on the floor or firewall, on the rear wall of a truck cab, or any other convenient operating location, using the "L" shaped mounting bracket supplied. The unit is held securely in this bracket by means of two wing head fasteners, one on each side of the bracket. To remove the unit for service, it is simply necessary to loosen the two fasteners, tip the unit downward, and then lift it out of the bracket.

Mount the bracket in the vehicle either by means of the three mounting straps provided, or by fastening it directly to the vehicle. Drill all mounting holes with a 7/32" drill and use the #10 machine screws and nuts (in cloth bag) to mount the bracket. Fig. 3 shows a typical "under-dash" installation.

Mount the microphone holder, supplied with the unit, to the case, dash, or other convenient location. The holder may be mounted on the case either by the bottom two screws at the left side of the case, or by the two screws on the left top of the case. To mount the holder on the dash, use two #8 self-tapping or machine screws.

POWER SOURCE - The unit is wired at the factory for operation on either a 6 or 12 volt DC electrical system with either a positive or negative ground as specified by the customer (see tag attached to side of case). If the electrical system of the vehicle in which the unit is being installed corresponds to the tag, no electrical changes are required and it is simply necessary to connect the unit to the power source as outlined below.

CONNECTIONS TO POWER SOURCE

1. Connect power lead, at side of case, to terminal on ammeter which connects to headlights, accessories, etc. so that current drawn by unit will be indicated on ammeter.
2. Ground "Littlefone" case to vehicle with 18-inch length of flexible braid provided. (#8 lug on braid connects to any one of three screws at side of case; #10 lug connects to vehicle with screw and nut provided in cloth bag.) See Fig. 3.

POWER CHANGEOVER

1. To change from 6 to 12 volt operation (or 12 to 6 volt operation), it will be necessary to replace the vibrator (Part No. 27B187 for 6 volts and Part No. 27B108 for 12 volts) and to change the positions of the jumpers on terminal strip TS-101 as shown in Fig. 1.
2. On vehicles with positive side of battery grounded, insert vibrator so that plus (+) sign on vibrator faces rear of case. Conversely, on vehicles with negative side of battery grounded, insert vibrator so that negative (–) sign on vibrator faces rear of case. (See Fig. 2.)

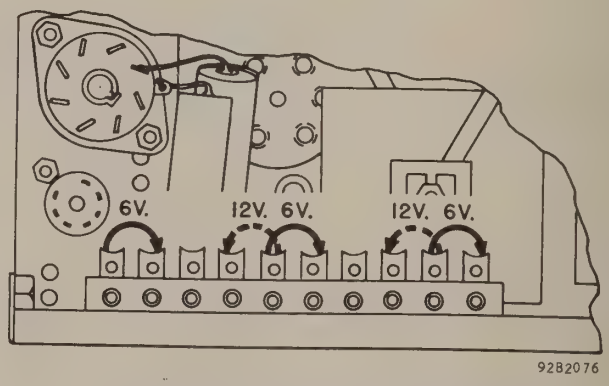


Fig. 1. Bottom View of Power Supply Chassis Showing Power Changeover Connections

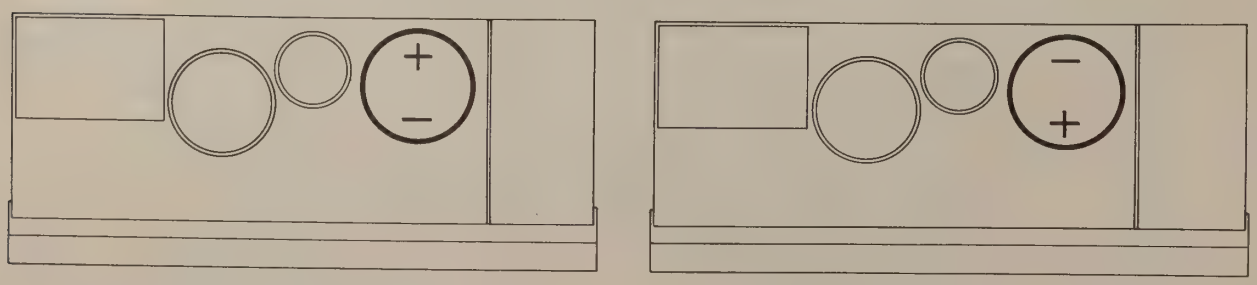


Fig. 2. Vibrator Polarity Adjustment

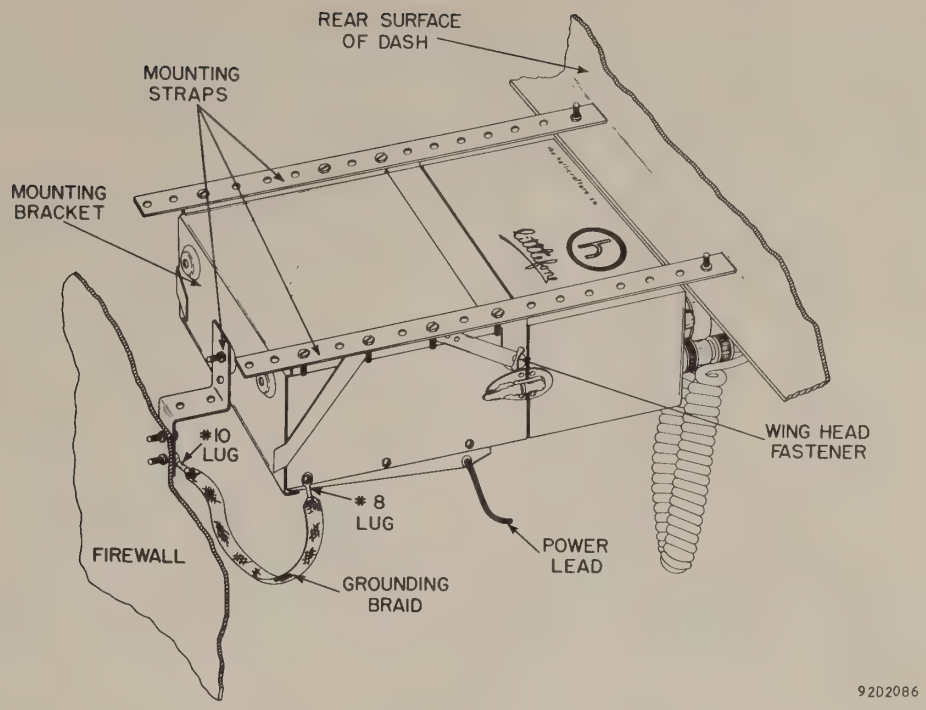


Fig. 3. Typical "Under-Dash" Installation

ANTENNA - The whip antenna provided with the unit may be easily mounted on the fender top or cowl of any vehicle. The swivel base permits adjustment of the antenna to match the contour of the vehicle. The antenna is supplied complete with connecting cable and connectors, mounting bracket and strap, and hardware. Since the antenna is basically short for the range of frequencies covered (25 to 50 MC), it is necessary to load it with a shorted stub arrangement to obtain a minimum standing-wave ratio. Before installing the antenna, construct the loading stub as outlined below.

CONSTRUCTING THE ANTENNA LOADING STUB (Refer to Fig. 5)

1. Determine lengths "A" and "B" from loading chart on page 6 and cut to proper length.
2. Short loading stub "B" by soldering the inner conductor to the outer braid. Tape the connection with rubber and friction tape.
3. Connect the coaxial plug not marked with a red dot to the end of cable "A" as shown in Fig. 4.

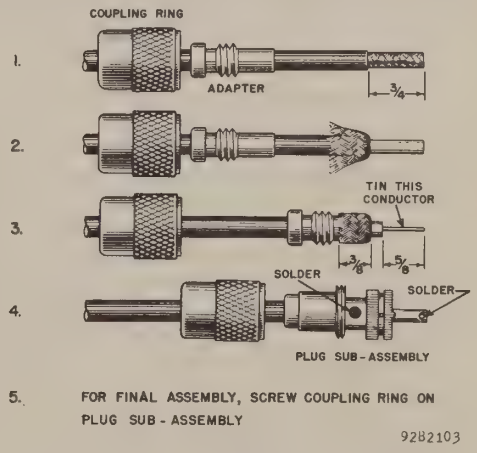


Fig. 4. Coaxial Plug Connections

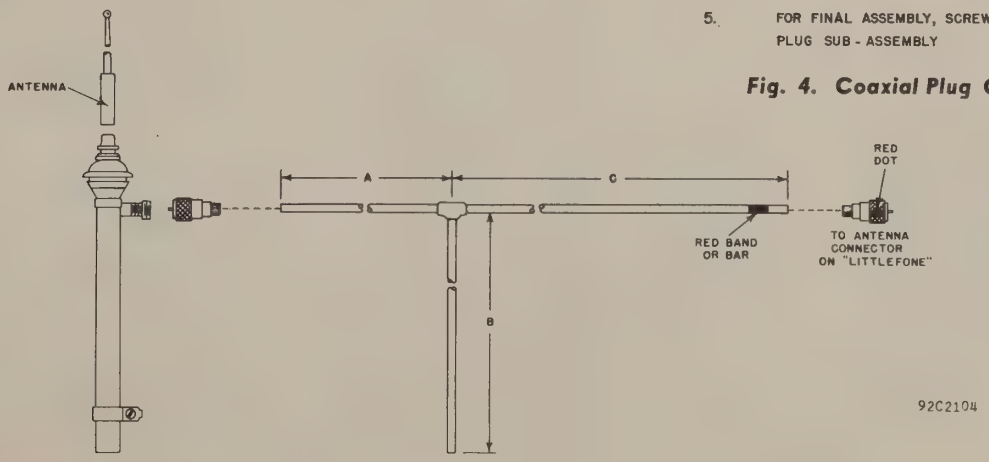


Fig. 5. Antenna Loading Stub

LOADING CHART

The following table gives the required lengths for Cables A & B of Figure 5

Freq. in Mc.	A in inches	B in inches	Freq. in Mc.	A in inches	B in inches
24	60	3	37	27	4-⅛
25	56-¼	3	38	25	4-⅜
26	53-⅛	3	39	23	4-¾
27	50-½	3-⅛	40	21-¼	5
28	47-¾	3-⅛	41	19-½	5-½
29	45	3-⅛	42	17-½	5-¾
30	42-½	3-¼	43	15	6-¼
31	40	3-¼	44	14	6-¾
32	37-¾	3-⅜	45	12-½	7-⅜
33	35-½	3-⅜	46	10-½	8
34	33-¼	3-½	47	8-½	8-¾
35	31-¼	3-¾	48	6-¼	9-¾
36	29	3-⅞	49	3-¾	10-¾
			50	1	12

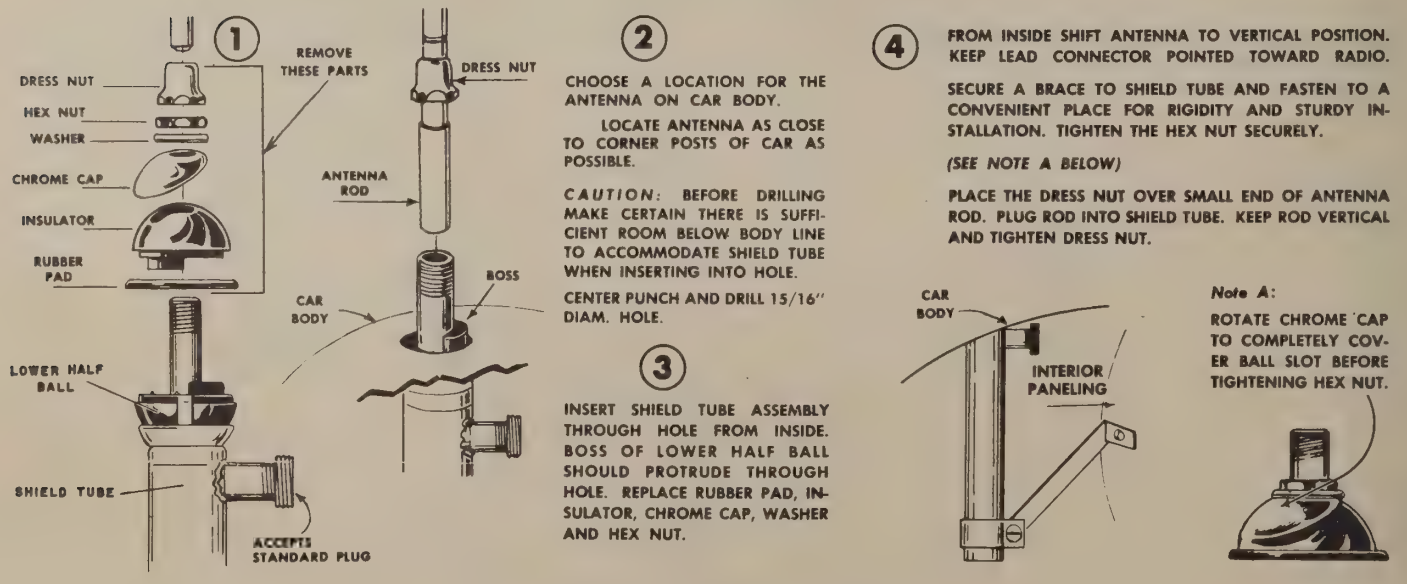
INSTALLING THE ANTENNA

1. Follow the mounting instructions given in Fig. 6 below.
2. Attach cable "A" to the antenna. Then feed cable "C" thru a hole in the body or firewall, protecting the cable by means of a grommet or tape.
3. Cut cable "C" to the length required to reach the antenna connector on the "Littlefone".
4. Connect the coaxial plug marked with a red dot to the end of cable "C" as shown in Fig. 4. Attach cable "C" to the antenna connector on the "Littlefone".

FINAL ADJUSTMENTS

Since the output tuning and loading adjustments for the final amplifier will vary with each installation, depending upon proximity of antenna to car body, it will be necessary to readjust the output tuning and loading adjustments at the time of installation. This is accomplished as follows:

A. Install the unit in the vehicle and connect the antenna.
B. Connect a DC milliammeter (0-50 ma) between the red, single pin plug and jack on the top of power supply chassis (lower chassis).
C. Remove the button plugs from the right side of the case to gain access to the two adjustments (9 and 10 on Fig. 12).
D. Set 9 (output loading capacitor) for maximum capacity as shown in Fig. 12. Adjust 10 (output tuning capacitor) for resonance as indicated by minimum plate current. Then decrease the value of 9 in small steps, each time retuning 10 for minimum plate current. Proper operation with rated power output is obtained with a plate current reading of approximately 40 ma.



92B2105

Fig. 6. Antenna Mounting Instructions

REMOTE SPEAKER CONNECTIONS- The 500 ohm output terminals for connecting a remote speaker are located on the frame of the built-in speaker (see Fig. 10). To connect the remote speaker, first remove the button plug on the front panel and insert the rubber grommet provided in the cloth bag. The grommet will accommodate two #22 (or smaller) insulated leads. The connections to the remote speaker are as shown in Fig. 7. The leads to the remote speaker should be knotted on the inside of the "Littlefone" case to act as a strain relief. In installations where the unit may be exposed to the weather, carefully weatherproof the lead opening in the front panel.

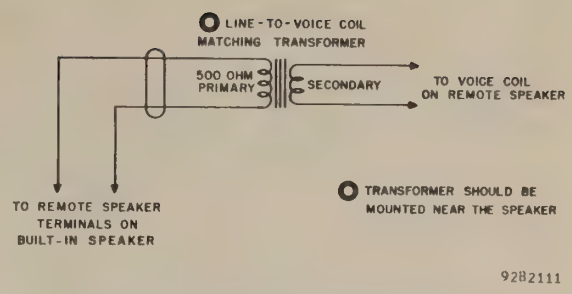


Fig. 7. Remote Speaker Connections

OPERATING INSTRUCTIONS

To operate the "Littlefone", place the power switch on the front panel of the case in the "on" position (up). The red jewel on the front panel will glow, indicating the unit is operating. Allow about one minute for the tubes to reach operating temperature and then rotate the VOLUME/SQUELCH control on the top of the case clockwise from the "MIN" position until the noise just disappears. (This adjustment is made with no signal input.) With the control set clockwise past "MIN", the squelch control is in operation to quiet the receiver when no signals are being received.

Since the setting of the VOLUME/SQUELCH control affects the audio intelligence on a weak signal (signal may sound choppy and distorted), it may be desirable when operating at the extreme range or "fringe area" to set the control counterclockwise from the "MIN" position. In this position, the control functions only as a volume control and does not provide the quieting feature of squelch. It will, however, permit the reception of weak signals which ordinarily might not be heard with the control set clockwise for squelch operation.

To transmit, press the button on the microphone (or handset), wait just a very short instant for the transmitting tubes to heat and then talk. To listen simply release the button. To turn the "Littlefone" off, return the power switch to the "off" position (down).

The operating range will depend upon the geographical and physical characteristics of the operating location as well as the height of the antenna on the unit with which communication is being maintained; the higher the antenna, the greater the range that can be expected. Best reception will usually be obtained over line-of-sight distances. If possible, operate the unit away from trees and foliage as they tend to absorb the signal. When operating at the extreme range or "fringe area", try various locations for best reception. In some instances, moving just a few inches may improve reception.

SERVICE

The Hallicrafters Company maintains an extensive system of authorized factory service centers where any required service can be accomplished promptly and efficiently at a nominal charge. These same service centers can also accomplish the semi-annual frequency measurement required by the F.C.C. The sign shown at the right is displayed by all authorized service centers. Any service work performed on this radio equipment must be under the supervision of an F.C.C. commercial licensed operator holding a 2nd Class Radio Telephone or higher grade of license.



The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

92X1401-C

NOISE SUPPRESSION

Most installations of the "Littlefone" will not require elaborate noise suppression of the motor vehicle. Therefore, before proceeding with the various methods of noise suppression, it is advisable to first determine the need for it. This is accomplished by moving the vehicle to a remote location at the outer limit of the equipments range. The locations selected should be as free from man-made interference as possible.

While receiving the distant station, determine the source of interference by noting the noise level with the vehicle at rest and motor off, and comparing it with the vehicle in motion and motor running. If there is no difference in the noise level, noise suppression of the vehicle would be of little use; if, however, the noise generated by the vehicle is heard above the external noise, suppression of the motor vehicle will be required.

The most common types of noise interference in a vehicle are ignition noise, generator "hash", voltage regulator interference, wheel and tire static, and noise caused by loose mechanical connections. The most effective way to suppress noise is to identify and locate each source and to apply a suppression component to each one in turn. Use the information which follows as a guide. Fig. 8 shows a typical battery ignition system and the correct placement of noise suppression components.

IGNITION NOISE

Ignition noise can be identified as a regular clicking or popping noise which varies with the speed of the motor. In most installation, it can be effectively suppressed by applying one or more of the methods listed below.

a. Insert a good grade 10,000-ohm carbon suppressor at the center tower of the distributor and a 5000-ohm carbon suppressor at each spark plug tower on the distributor. Replace existing spark plugs with resistor type spark plugs or fit them with good grade 10,000-ohm carbon suppressors. The motor timing should be readjusted after installing the suppressors.

b. Place a 0.1 mfd. capacitor in the lead from the ignition switch to the ignition coil, mounted as close as possible to the coil, to prevent high frequency energy from getting back into the low voltage wiring of the vehicle. Additional noise suppression may be obtained by shielding the lead from the coil to the switch and grounding the shield at the fire wall.

c. The metal caps terminating the ignition wires at the distributor are simply clamped to the ends of the cables and depend upon uncertain pressure contact with the wire. These caps should be cleaned and then soldered to the wire to prevent sparking at these points. The cable insulation should be closely inspected for breakdown between wires and ground. Use fiber spacers to keep the cables away from ground and if necessary, reroute the cables to minimize coupling with the low voltage wiring.

GENERATOR "HASH"

Generator "hash" is caused by sparking at the commutator and can be identified as a high pitched whine which varies with the speed of the motor. This trouble can usually be remedied by connecting a .005 mfd disc capacitor, alone or in parallel with a 500 mfd electrolytic capacitor, between the generator output terminal and ground. It is important that the polarity and working voltage of the electrolytic capacitor be observed. If the noise persists or is still excessive, a parallel trap, tuned to the receiver frequency, should be inserted in series with the generator output lead.

VOLTAGE REGULATOR INTERFERENCE

Voltage regulator interference is caused by sparking at the regulator points as they operate to reduce the charging rate as the battery approaches full charge. It appears as a distinct but irregular clicking sound which tends to be less steady than that from the ignition system. Regulator interference can usually be remedied by connecting a .002 mfd mica capacitor in series with a 4-ohm carbon resistor between the field terminal of the regulator and ground. Further suppression may be obtained by inserting a 0.1 mfd coaxial capacitor in series with the voltage regulator leads to the battery and the generator armature. All components should be mounted as close to the regulator as possible for effective suppression.

WHEEL STATIC

Wheel static is caused by grease in the front wheel bearings insulating the wheels from the chassis of the vehicle. It appears as a steady popping in the receiver at speeds over about 15 mph on smooth roads. Generally, it will not be present on dirt, gravel, or wet roads. Wheel static can be eliminated by installing front wheel static collectors available through most automotive dealers. These collectors will usually require replacement every 10,000 miles.

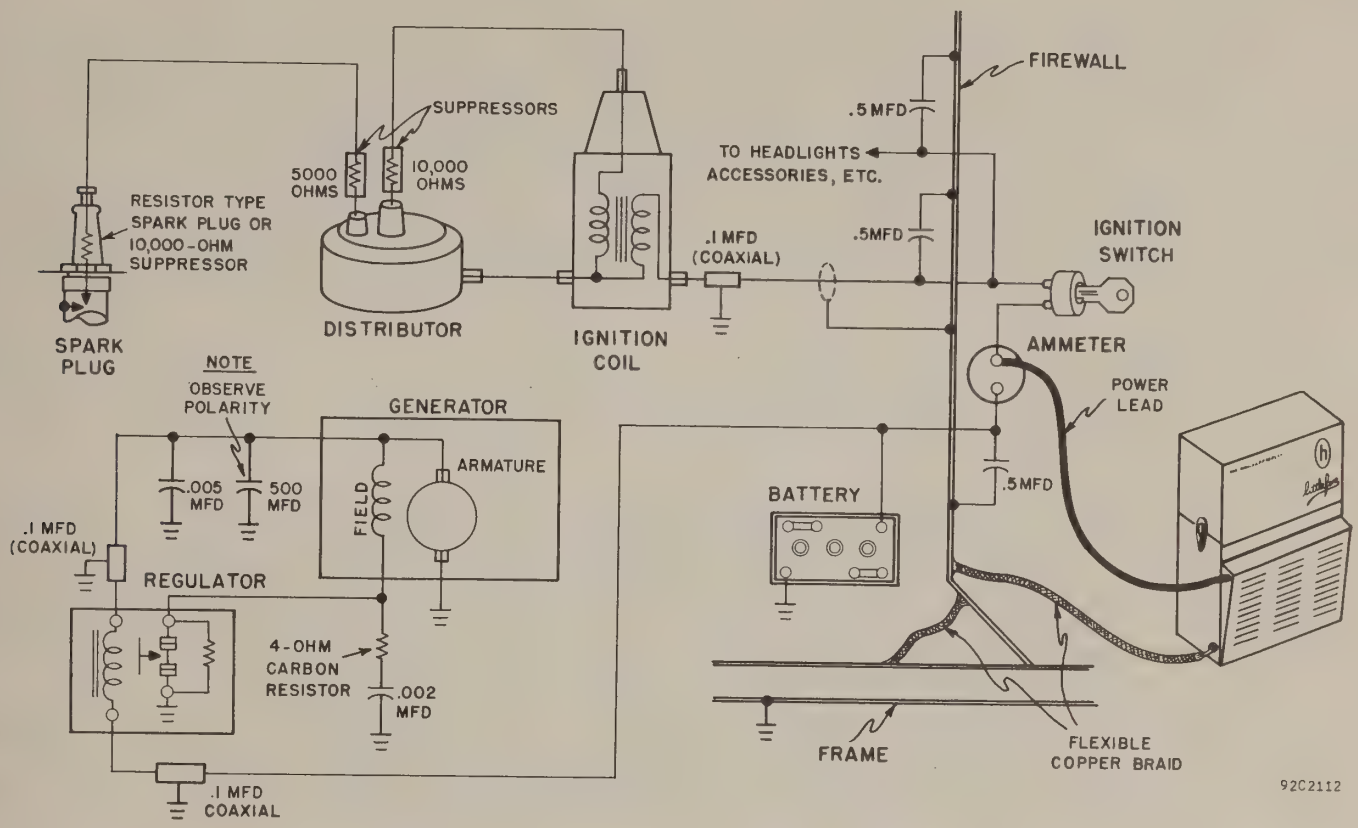


Fig. 8. Typical Ignition System Showing Placement of Noise Suppression Components

TIRE STATIC

Tire static causes an erratic popping noise heard only when the car in motion. This noise can usually be eliminated by injecting an anti-static powder into the inner tubes through the valve stems.

MISCELLANEOUS

1. When mounting the noise suppression components, thoroughly clean the contacting surfaces and use external tooth-type lockwashers under all mounting nuts or bolts.

2. The battery leads to the ammeter, gasoline gauge, ignition switch, headlights, taillight, and any accessories should be bypassed to ground with 0.5 mfd metal-case capacitors.

3. The fire wall should be bonded to both the frame of the vehicle and the motor block with flexible copper braid. If the exhaust pipe and muffler are insulated from the frame, ground them to the frame with flexible copper braid.

4. The steering post, as well as any control rods, metal tubes, etc. which pass through the fire wall should be securely bonded to the fire wall with flexible braid.

5. Tighten any loose bolts, especially bumper and fender bolts, and use external tooth-type lockwashers to insure good electrical contact.

CIRCUIT DESCRIPTION

RECEIVER

The receiver is a crystal controlled, double conversion type FM receiver employing twelve tubes and two crystal diodes. All tubes are of the sub-miniature type and are socket mounted. The tube complement is given in the Service Parts List.

A signal at the operating frequency is received at the antenna and is amplified by the 1st and 2nd RF amplifiers, V-1 and V-2. This amplified signal is applied to the 1st mixer, V-3 where it is mixed with the injection voltage from the plate circuit of the crystal oscillator, V-11, at the proper harmonic of the crystal frequency. The second harmonic is used on receivers operating from 25 to 35.98 megacycles and the third harmonic, on receivers operating from 36 to 50 megacycles. The first intermediate frequency is less than the crystal frequency by 1.7 megacycles. The first IF signal is amplified by the 1st and 2nd IF amplifiers, V-4 and V-5, and then applied to the signal grid of the 2nd mixer, V-6. Here it is mixed with the injection voltage from the screen grid of the crystal oscillator, V-11, at the crystal frequency, obtaining the second intermediate frequency of 1.7 megacycles. This IF signal is amplified by the 3rd IF amplifier, V-7, and the 1st and 2nd limiters, V-8 and V-9. After limiting, the signal is applied to the discriminator where the audio is recovered.

The audio signal is amplified by the audio amplifier, V-10, and fed through the black, single pin plug, PL-3, to the audio output stage, V-101, on the power supply chassis. The signal is also applied to the primary of output transformer T-9. The secondary of T-9 connects to pin 4 of microphone socket SO-2 to supply an audio output of approximately 5 milliwatts for operating the earpiece of a telephone handset which may be used in place of the hand microphone normally supplied.

A squelch circuit is provided to quiet the receiver when no signal is being received. The center-tapped volume/squelch control, R-20, provides squelch action if the arm of the control is set above center tap (clockwise from center); with the arm below center tap (counterclockwise from center), the control functions only as a volume control. The non-squelch portion of the control is provided for fringe area reception where squelch is usually undesirable from the standpoint of signal reduction. V-12, a diode-pentode, is used as a noise amplifier and rectifier. Noise voltage is taken from the grid of the 1st limiter, V-8, amplified, rectified and applied to the grid of the audio amplifier, V-10, biasing it to cutoff. When a signal is received, the limiter grid voltage increases and cuts off the noise amplifier. Thus, the cutoff voltage is removed and the audio amplifier operates normally.

The "Littlefone" is normally in a ready-to-receive condition; i.e., the receiver filaments are "on" and the transmitter filaments are "off". When the button on the microphone is depressed, power is applied to the filament changeover relay, RY-1. This relay in turn transfers the filament voltage from the receiver to the transmitter, thus placing the "Littlefone" in a ready-to-transmit condition.

TRANSMITTER

The transmitter is a standard crystal controlled FM transmitter. All tubes are of the sub-miniature type and are socket mounted. The tube complement is given in the Service Parts List. The crystal oscillator, V-13, supplies RF voltage at the crystal frequency to the grids of the modulators, V-14 and V-15. Phase modulation is developed in the grids of these tubes. The output of the modulators is multiplied through a series of four multipliers, V-16, V-17, V-18 and V-19; 27 times on transmitters operating from 25 to 29.5 megacycles, 32 times from 29.54 to 33.5 megacycles, 36 times from 33.54 to 44.5 megacycles, and 48 times from 44.54 to 50 megacycles. The output from the final multiplier is applied to the buffer-driver, V-20, which in turn drives the final amplifier stage. The final consists of two triodes connected in parallel to provide a 2.0 watt output. A pi network is used in the final tank circuit to couple the output of the transmitter to the whip antenna. The microphone supplied is a single button carbon type with press-to-talk button.

POWER SUPPLY AND AUDIO OUTPUT

The audio output stage and power supply are contained on a common chassis located in the lower compartment of the case. The power supply is of the synchronous vibrator type and is designed for operation on both 6 and 12 volt DC supplies. Power changeover is accomplished by replacing the vibrator and changing the positions of the jumpers on terminal strip TS-101.

The rectified AC voltage developed across the high voltage secondary of vibrator transformer T-102 is filtered by a dual section capacitor, C-105, and regulated by means of current regulating lamps, LM-101 and LM-102, to provide the +135 volt plate supply for the transmitter buffer and final amplifiers. Current regulating lamp LM-103 and a type OB2 voltage regulating tube (V-102) provide the regulated ±105 volt supply for all tubes in the transmitter and receiver, except the transmitter buffer and final amplifiers.

The low voltage winding of vibrator transformer T-102 feeds a full-wave rectifier circuit employing a dual section selenium rectifier, SR-101. The rectified output is regulated by a series "Amperite" current regulating tube, V-103, and filtered by capacitors C-111 and C-112 to supply the regulated +2 volt filament supply for all tubes in the trans-

mitter and receiver. R-3 and R-49, connected from the filament changeover relay, RY-1, to the receiver and transmitter filament strings respectively, drop the voltage from +2 volts to +1.25 volts for proper filament operation. Current equalizing resistor R-32, connected in parallel with the receiver filament string is used to improve the regulation between the transmit and receive positions.

The audio output signal from the audio amplifier, V-10, on the transmitter-receiver chassis (top chassis) is fed through a single pin plug, PL-3, to the audio input jack, J-101, on the power supply chassis. (See Fig. 10.) The signal is applied to the audio output tube, V-101, which provides the power to drive the built-in speaker LS-101. The secondary of output transformer T-101 provides a 500-ohm output for connecting a remote speaker.

PL-101 and J-102 are a single pin plug and jack for connection to a DC milliammeter when tuning the transmitter. They are located on the power supply chassis. (See Fig. 10.)

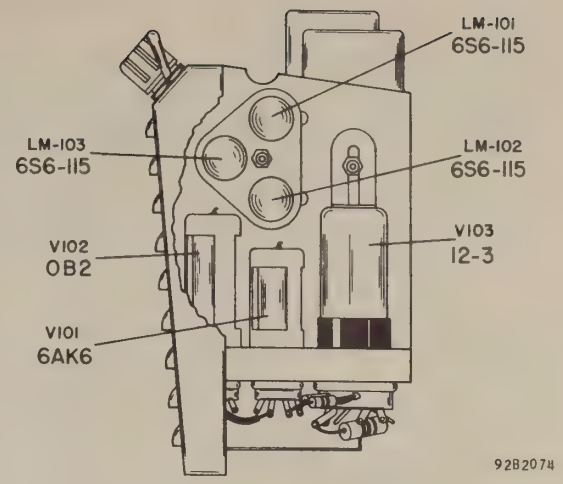


Fig. 9. Side View of Power Supply Chassis Showing Tube Location

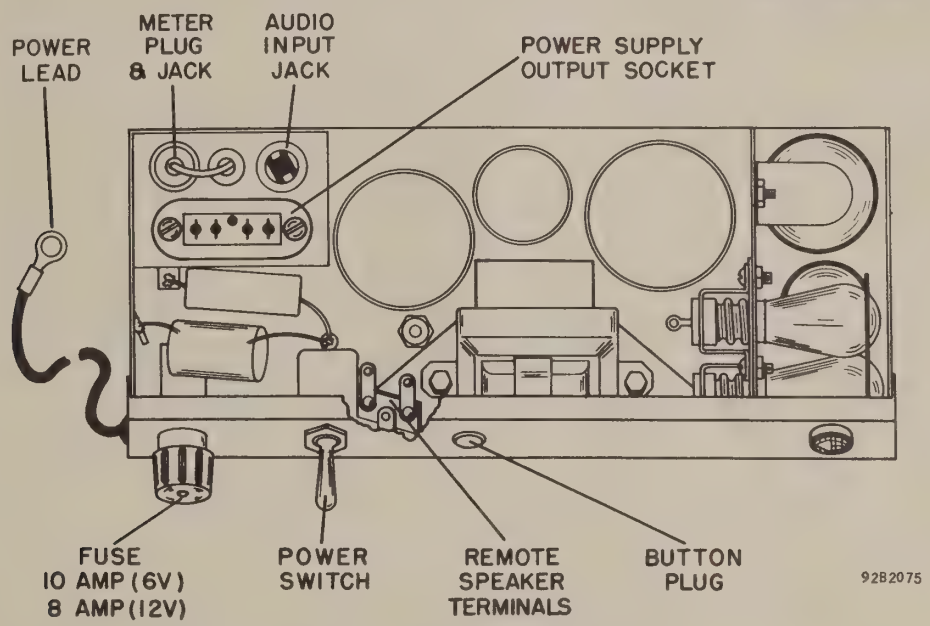


Fig. 10. Top View of Power Supply Chassis

PREVENTIVE MAINTENANCE

A regular preventive maintenance procedure should be followed to prevent unnecessary interruption in the operation of this equipment. This maintenance procedure should include the following:

(1) Make a semi-annual check of the operating frequency as required by the F.C.C. to assure that it is within .005% of the assigned operating frequency.

(2) Take periodic meter readings and, in case of abnormal readings, check tubes.

(3) Periodically check the receiver sensitivity with the receiver in the case. (Normal sensitivity is approx. -3 volts at M (1st limiter grid resistor) for 0.3 microvolt at the antenna input.)

(4) If the receiver sounds distorted, check the discriminator setting against a transmitter on the receiver operating frequency. (See Step 7 under Receiver Alignment on page 16.)

(5) Check the antenna loading by observing the combined buffer and final amplifier plate current. This is accomplished by connecting a 50 ma. DC milliammeter between the red, single pin plug and jack on the power supply chassis (see Fig. 10). Proper operation with rated power output is obtained with a plate current reading of approximately 40 ma.

ALIGNMENT INSTRUCTIONS

EQUIPMENT REQUIRED

1. Laboratory type signal generator covering 7.2 - 11.3 MC and 25 - 50 MC and having excellent frequency stability and accurate microvolt calibrated output attenuator (output attenuation to 0.1 microvolt). Measurements Corp. Model 80 or equivalent.

2. 1.7 MC Crystal controlled oscillator or other stable, accurate 1.7 MC signal source for alignment of receiver IF and discriminator stages. A suitable crystal oscillator circuit which may be readily constructed is shown on page 16 .

3. Vacuum tube voltmeter with 0-3 and 0-30 volt DC ranges.

4. DC milliammeter (0-50 ma) with connectors for connecting to red, single pin plug and jack on power supply chassis (See Fig. 10).

5. Frequency meter with calibration and measurement accuracy of at least .005% for measuring transmitter output frequency. Lampkin Micrometer Frequency Meter Model 105-B or equivalent.

6. Absorption wavemeters covering 2.5 to 50 megacycles for checking alignment of multiplier stages in transmitter and receiver. Measurements Corp. "Megacycle Meter" Model 59 or James Millen Mfg. Co. Midget Absorption Frequency Meter Models 90605, 90606, 90607 and 90625 (four units required to cover frequency range).

7. RF wattmeter for power output measurements (0-2 watts in frequency range of 25-50 megacycles). Bird Electronics Corp. "Termaline" RF Wattmeter Model 61 or equivalent. Wattmeter cable should be equipped with Amphenol Plug 83-1SP to mate with the antenna connector on "Littlefone".

8. 1.0 megohm resistor connected in series with VTVM probe to minimize loading and detuning.

CRYSTAL TYPES

To facilitate crystal procurement during production, units were supplied with either JAN type CR-18/U or James Knight type H-17 crystals. (The crystal type is marked on the crystal case.) Replacement should be made with the same type crystal if possible, since circuit modifications and realignment of the associated oscillator circuit are required when replacement is made with a crystal type different from the one in the unit. The circuit modifications required when replacing the H-17 crystal with the more readily available CR-18/U crystal are listed below.

TO REPLACE THE H-17 CRYSTAL WITH THE CR-18/U CRYSTAL

Receiver Crystal

1. Add C-91, a 5-25 mmf trimmer (Part No. 44B430) across the receiver crystal socket.
2. Change the value of C-19, located between the screen of V-11 and grid of V-6, from 1.0 mmf to 4.7 mmf. (Part No. 47A160-6).
3. Change the value of R-13, dropping resistor for V-11, from 10,000 ohms to 4700 ohms (23X20X472K).

Transmitter Crystal

1. Add C-78, a 5-25 mmf trimmer (Part No. 44B430) across the transmitter crystal socket.

PRELIMINARY ADJUSTMENT

Before starting alignment, measure the transmitter and receiver filament voltages. The filament changeover relay (see Fig. 11) is normally in the "receive" position. To place it in the "transmit" position, merely depress the button on the microphone (or handset). To measure the filament voltages, connect the VTVM to the center terminal on the changeover relay. The filament voltage reading in both the transmit and receive positions should be approximately +2 volts. If the reading in the receive position differs from the transmit position, adjust 29 (tap on the current stabilizing resistor, see Fig. 11) until the receiver voltage is equal to the transmitter voltage. When making the adjustment, wait until the reading stabilizes before readjusting.

NOTE: Refer to Figs. 10, 11, and 12 for the location of all alignment adjustments and test points. The adjustment and test points are also shown on the schematic diagram.

TRANSMITTER ALIGNMENT

Before proceeding with the transmitter alignment, remove the plate voltage from the buffer and final amplifier stages by disconnecting the red, single pin plug on the power supply chassis (see Fig. 10). Then connect a short circuiting jumper between terminals 1 and 2 of the microphone socket to place the filament changeover relay in the energized or "transmit" position.

TRANSMITTER ALIGNMENT (Cont.)

1. On units with JAN type CR-18/U crystal:
   Set 30 (crystal trimmer) in the middle of its tuning range as shown in Fig. 12. Connect the VTVM to R (oscillator grid) and adjust 1 (oscillator plate) for max. neg. voltage at the oscillator grid. Back out 1 (oscillator plate) until the oscillator grid voltage drops to -6.5 volts. This sets the proper "drive" for the transmitter oscillator.

   The transmitter oscillator is operating properly when the VTVM reading at A or B (grid of either modulator) is between -2.5 and -3 volts. Because of slight differences in crystal activity, it may be necessary to slightly readjust 1 (oscillator plate) until the proper modulator grid voltage is obtained.

   On units with James Knight type H-17 crystal:
   Connect the VTVM to A or B (grid of either modulator) and adjust 1 (oscillator plate) for max. neg. voltage at the crystal frequency (marked on top of crystal). Approx. -3 volts.

2. Connect the VTVM to C (1st multiplier grid) and adjust 2 (modulator plate) for max. neg. voltage at the crystal frequency. Approx. -20 volts.

3. Connect the VTVM to D (2nd multiplier grid) and adjust 3 (1st multiplier plate) for max. neg. voltage at the harmonic of the crystal frequency specified in the chart below. Approx. -20 volts. Then touch up 2 (modulator plate).

4. Connect the VTVM to E (3rd multiplier grid) and adjust 4 (2nd multiplier plate) for max. neg. voltage at the harmonic of the crystal frequency specified in the chart below. Approx. -14 volts. Then touch up 3 (1st multiplier plate).

5. Connect the VTVM to F (4th multiplier grid) and adjust 5 (3rd multiplier plate) for max. neg. voltage at the harmonic of the crystal frequency specified in the chart below. Approx. -25 volts. Then touch up 4 (3rd multiplier plate).

6. Connect the VTVM to G (buffer grid) and adjust 6 (4th multiplier plate) for max. neg. voltage at the harmonic of the crystal frequency specified in the chart below. Approx. -20 volts. Then touch up 5 (3rd multiplier plate).

Littlefone Operating Freq. (MC)	CRYSTAL HARMONIC			
	1st Mult.	2nd. Mult.	3rd Mult.	4th. Mult.
25.00 - 29.5	3	9	27	27
29.54 - 33.5	4	8	16	32
33.54 - 44.5	3	9	18	36
44.54 - 50.0	4	12	24	48

7. Remove the plate voltage from the final amplifiers by disconnecting wire jumper H (see Fig. 12). Then apply plate voltage to the buffer stage by connecting the milliammeter between the red, single pin plug and jack on the power supply chassis.

8. Adjust 7 (buffer plate) for dip in buffer plate current as indicated on milliammeter.

9. The buffer stage has been neutralized at the factory and should normally not require readjustment. To determine if adjustment is necessary, first remove the plate voltage from the buffer stage by disconnecting the milliammeter. Then connect the VTVM to J (final grid resistor). If the stage is properly neutralized, an indication of approximately -.2 volt or less will be obtained on the VTVM. If neutralization is required, follow the procedure outlined under BUFFER NEUTRALIZATION on page 14.

10. The final amplifier stage has also been neutralized at the factory and should normally not require readjustment. A check may be made to determine if adjustment is necessary as follows:

    (a) Set 9 (output loading capacitor) for maximum capacity by setting the solder spot on the rotor plate opposite the one on the stator plate.

    (b) Connect the VTVM to J (final grid resistor).

    (c) Apply plate voltage to the buffer stage by reconnecting the milliammeter. Retune 7 (buffer plate) for dip in plate current. Tune 11 (final grid) for max. neg. voltage on VTVM. The buffer plate current indication should be approximately 10 milliamperes. Detune 7 slightly and retune 11 and observe buffer plate current. The condition giving maximum negative voltage on VTVM with minimum buffer plate current is the proper operating condition.

    (d) Tune 10 (output tuning capacitor) through resonance. If the final amplifier stage is not neutralized, a large dip in grid voltage will be noted as 10 is tuned through resonance; if properly neutralized, little change in grid voltage will be noted (approximately 6 volts or less). If neutralization is necessary, follow the procedure outlined under FINAL AMPLIFIER NEUTRALIZATION on page 14.

11. Set 9 (output loading capacitor) for maximum capacity by setting the solder spot on the rotor plate opposite the one on the stator plate. Apply plate voltage to the final amplifiers by connecting wire jumper H.

12. Connect the VTVM to J (final grid resistor). Tune 10 (output tuning capacitor) for minimum plate current. Slightly retune 11 (final grid) for maximum grid voltage as indicated on the VTVM. Repeat the procedure several times, tuning 10 for minimum plate current and 11 for maximum grid voltage. Correct adjustment of the final amplifiers is indicated by a VTVM reading of -25 to -42 volts.

13. Connect the antenna.

14. Adjust 10 (output tuning capacitor) for resonance as indicated by minimum plate current. Then decrease the value of 9 (output loading capacitor) in small steps, each time retuning 10 for minimum plate current. Proper operation with rated power output is obtained with a plate current of approx. 40 ma.

15. The power output of the transmitter may be measured by connecting the RF wattmeter to the antenna connector and adjusting 9 (output loading capacitor) and 10 (output tuning capacitor) as indicated in Step 14. Normal power output is 2 watts. Since the wattmeter may not present the same capacitive load as the antenna, it may be necessary to connect a 50 to 100 mmf fixed capacitor across C75 (output loading capacitor) to properly load the transmitter into the wattmeter. The value of this capacitor is dependent upon the operating frequency and should be chosen so that proper loading can be obtained. This capacitor should be removed upon completion of this step.

16. Align the receiver if required.

17. On units with JAN type CR-18/U crystal:
    Set the transmitter on frequency by adjusting 30 (crystal trimmer). Recheck the "drive" as outlined in Step 1 and then recheck the operating frequency. If necessary, touch up all tuning adjustments except the oscillator adjustments.

    On units with James Knight type H-17 crystal:
    Set the transmitter on frequency by adjusting 1 (oscillator plate). If necessary, touch up all tuning adjustments except the oscillator adjustment.

    NOTE: The operating frequency must be within .005% of the assigned operating frequency to comply with F.C.C. regulations.

18. Place the chassis in the case and then install the complete unit in the vehicle. Connect the antenna and repeat Step 14. To gain access to the output tuning and loading adjustments, 9 and 10, remove the button plugs from the right side of the case.

BUFFER NEUTRALIZATION

1. Before neutralizing the buffer, follow the instructions given in Step 9 on page 13.

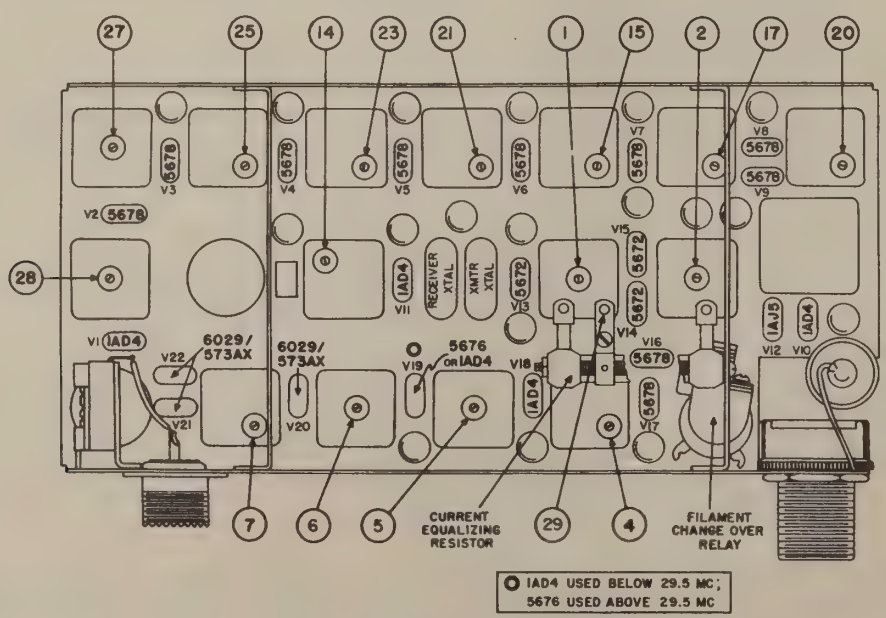
2. To neutralize the buffer stage, adjust 8 (buffer neutralizing capacitor) for a minimum reading on the VTVM. Then retune 7 (buffer plate) and 11 (final grid) to provide a maximum reading on the VTVM. Repeat the procedure until a VTVM indication of approximately -.2 volt or less is obtained.

3. Apply plate voltage to the buffer stage by reconnecting the milliammeter. Connect the VTVM to G (buffer grid) and touch up 6 (4th multiplier plate) to maximize buffer grid voltage.

FINAL AMPLIFIER NEUTRALIZATION

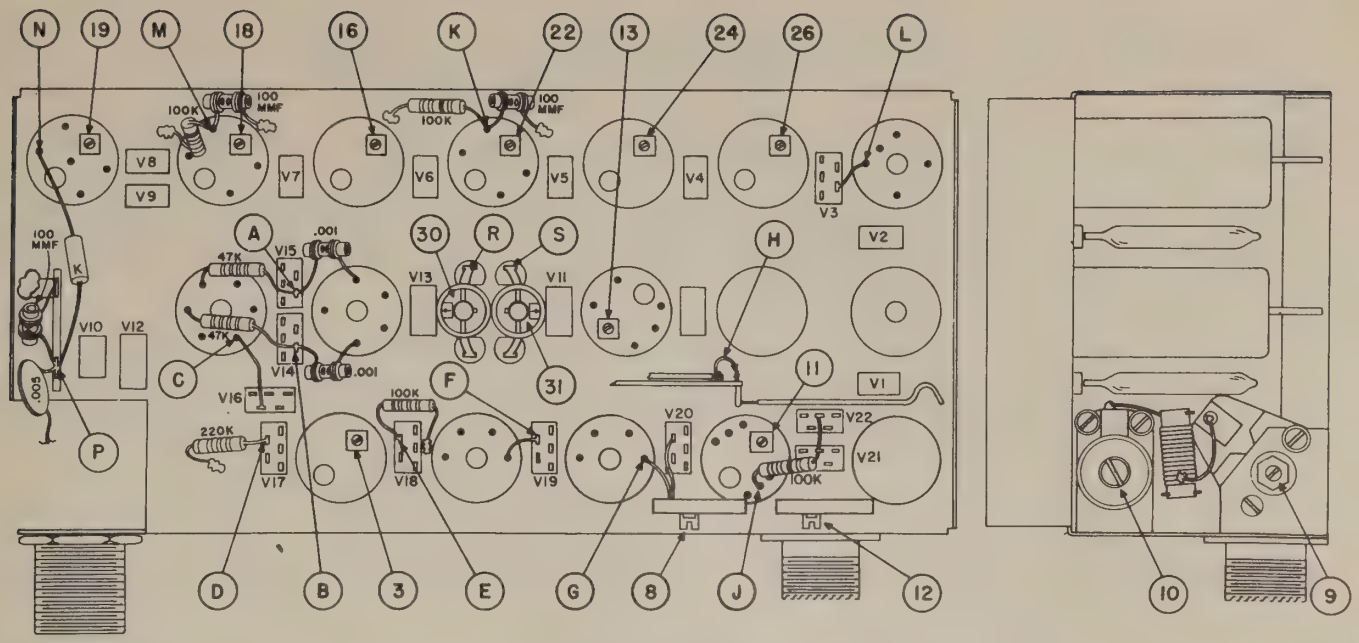
1. Before neutralizing the final amplifiers, follow the instructions given in Step 10 on page 13.

2. To neutralize the final, make small adjustments of 12 (final neutralizing capacitor) for minimum reaction in grid voltage as 10 (output tuning capacitor) is tuned through resonance. With each small adjustment of 12, retune 11 (final grid) to maximize the VTVM indication. When neutralization is complete, tuning 10 through resonance will not have any appreciable effect upon the VTVM indication.



92C1848-A

Fig. 11. Top View of Transmitter-Receiver Chassis Showing Location of Alignment Adjustments and Tubes



92C2106

Fig. 12. Bottom and Side Views of Transmitter-Receiver Chassis Showing Location of Alignment Adjustments and Test Points

RECEIVER ALIGNMENT

1. On units with JAN type CR-18/U crystal:

   Set 31 (crystal trimmer) in the middle of its tuning range as shown in Fig. 12. Connect the VTVM to S (oscillator grid) and adjust 13 (oscillator screen) for max. neg. voltage at the oscillator grid. Back out 13 (oscillator screen) until the oscillator grid voltage drops to -7 volts on models with crystal frequency below 10 MC and to -5.5 volts on models with crystal frequency above 10 MC. Connect the VTVM to K (2nd mixer grid resistor). When the oscillator is functioning properly, voltage at this point should read approx. -1 volt. Due to slight differences in crystal activity, it may be necessary to slightly readjust 13 (oscillator screen) until the reading at K (2nd mixer grid resistor) is approximately -1 volt.

   On units with James Knight type H-17 crystal.

   Connect the VTVM to K (2nd mixer grid resistor) and adjust 13 (oscillator screen) for max. neg. voltage. Approx. -1 volt.

   It should be noted that the magnitude of the bias voltage developed at the 1st and 2nd mixers by the oscillator injection signal will depend to a large extent upon how 27 (2nd RF plate) and 21 and 22 (2nd IF plate) are tuned. When the entire receiver is properly aligned, these voltages will be different (usually lower) than the values indicated in the alignment instructions.

2. Connect the VTVM to L (1st mixer grid) and adjust 14 (oscillator plate) for max. neg. voltage at the correct harmonic of the crystal frequency. Approx. -1 volt. Adjust for the 2nd harmonic on models operating from 25 to 35.98 MC and the 3rd harmonic from 36 to 50 MC.

3. Connect the 1.7 MC signal source to K (2nd mixer grid resistor).

   a. Connect the VTVM to M (1st limiter grid resistor). Adjust 15 and 16 (2nd mixer plate) and 17 and 18 (3rd IF plate) for maximum indication.

   b. Connect the VTVM to N (disc. input) and adjust 19 (disc. primary) for maximum indication. Approx. 10 volts, positive or negative.

   c. Connect the VTVM to P (disc. output) and adjust 20 (disc. secondary) for zero reading on the VTVM. The correct zero point is between a positive and negative maximum.

4. Set the signal generator at the 1st IF frequency (1st IF = Crystal Freq. - 1.7 MC) and connect it to K (2nd mixer grid resistor). Connect the VTVM to P (disc. output). Carefully adjust the signal generator frequency for a zero reading on the VTVM.

5. Disconnect the generator and connect it to L (1st mixer grid). Connect the VTVM to M (1st limiter grid resistor). Adjust 21 and 22 (2nd IF plate), 23 and 24 (1st IF plate) and 25 and 26 (1st mixer plate) for maximum indication on the VTVM.

6. Connect the VTVM to P (disc. output). Connect the generator to the antenna input and set it at the receiver operating frequency by tuning for a zero reading on the VTVM. Then connect the VTVM to M (1st limiter grid resistor) and adjust 27 (2nd RF plate) and 28 (1st RF plate) for maximum indication. Approx. -3 volts for 0.3 microvolt input.

   NOTE: Several peaks may occur; choose one which gives maximum indication.

7. Attach the antenna and check the discriminator setting against a transmitter on the receiver operating frequency. The VTVM indication at P (disc. output) should be zero volts, plus or minus 0.1 volt. If not, readjust 20 (disc. sec.) until a zero reading is obtained. Then connect the VTVM to M (1st limiter grid resistor) and touch up all adjustments except 13 (oscillator screen) and 31 (crystal trimmer).

8. If lower than normal sensitivity is noted, the receiver crystal may be operating at a frequency just slightly different from that indicated on the holder. To remedy such a condition, follow the procedure outlined below.

   a. Set the signal generator on the receiver operating frequency with the frequency meter. An alternate method is to use a tunable receiver such as the Hallicrafters S-82, zero beating the signal generator with a transmitter on the receiver operating frequency.

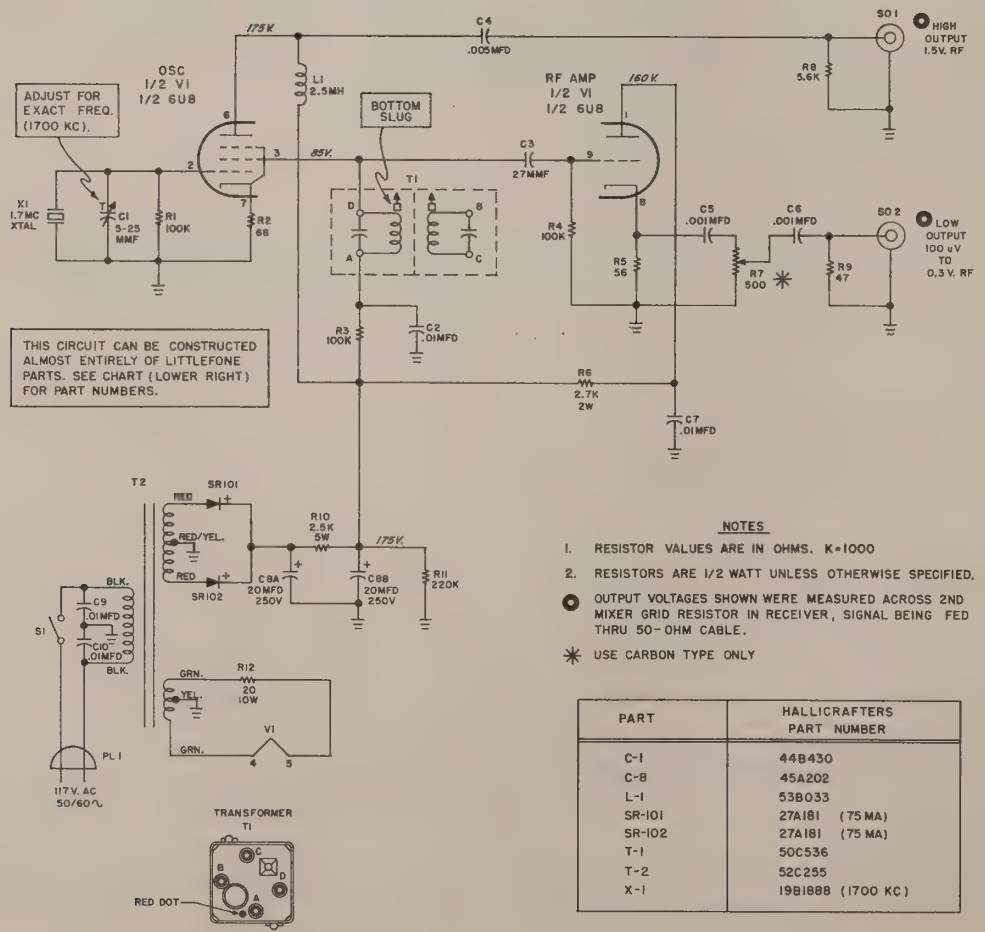
   b. Connect the signal generator to the antenna input and the VTVM to N (disc. input).

   c. On units with JAN type CR-18/U crystal:
      Touch up 31 (crystal trimmer) and 14 (oscillator plate) for max. neg. voltage, keeping the generator output as low as possible.

      On units with James Knight type H-17 crystal:
      Touch up all IF adjustments including the disc. primary for max. neg. voltage. Keep the generator output as low as possible.

1.7 MC CRYSTAL OSCILLATOR

(Used for alignment of receiver IF and discriminator stages)



NOTES

1. RESISTOR VALUES ARE IN OHMS. K=1000
2. RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.

○ OUTPUT VOLTAGES SHOWN WERE MEASURED ACROSS 2ND MIXER GRID RESISTOR IN RECEIVER, SIGNAL BEING FED THRU 50-OHM CABLE.

✳ USE CARBON TYPE ONLY

PART	HALLICRAFTERS PART NUMBER
C-1	44B430
C-8	45A202
L-1	53B033
SR-101	27A181 (75 MA)
SR-102	27A181 (75 MA)
T-1	50C536
T-2	52C255
X-1	19B1888 (1700 KC)

9202024

MODEL HT-25
SPECIFICATIONS

TYPE: Mobile FM Transmitter-Receiver

FREQUENCY RANGE: 25 to 50 MC

TRANSMITTER

1. Power Output	2.0 watts.
2. Frequency Stability	0.005% from -20° to + 70° Centigrade. Crystal controlled. Crystal frequency multiplied 27 times from 25.0 to 29.5 MC, 32 times from 29.54 to 33.5 MC, 36 times from 33.54 to 44.5 MC and 48 times from 44.54 to 50 MC.
3. Modulation	Phase. ± 15 KC deviation (no modulation limiter).
4. Antenna	Flexible whip for fender or cowl mounting. 50 ohm impedance.
5. Spurious Radiation	60 db down.
6. Pre-emphasis	Standard 6 db per octave.
7. Distortion	9% with 100% modulation at 1000 cps.
8. Power Requirements	Filament: 1.25 volts at 1.2 amps Plate: 135 volts at 30 ma; 105 volts at 17 ma.
9. Power Input to Final	135 volts at 22 ma.
10. Duty Cycle	1 minute on, 1 minute off.
11. Microphone	Single button carbon microphone with press-to-talk button.
12. Tubes	10

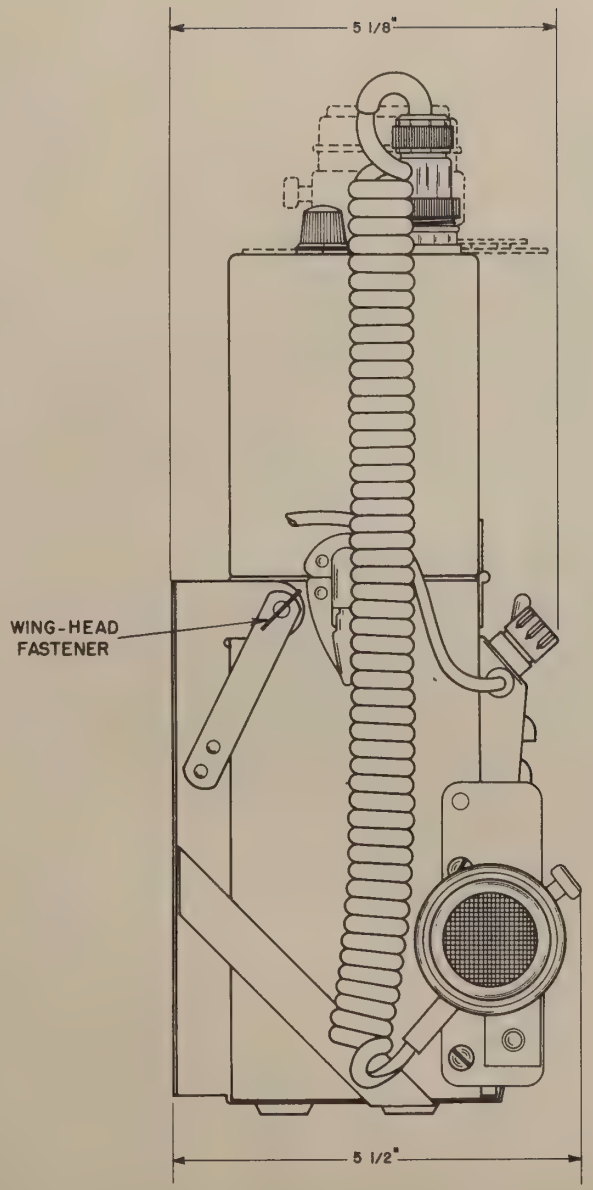
RECEIVER:

1. Sensitivity	0.3 microvolt or better for 20 db signal to noise ratio.
2. Selectivity	60 db at 45 KC. 95 db at 60 KC.
3. Frequency Stability	0.005% from -20° to + 70° Centigrade.
4. Receiver Type	Superheterodyne. Double conversion crystal controlled local oscillator.
5. Spurious Response	All more than 75 db down.
6. Audio Output (for earpiece of telephone handset)	5 milliwatts with 15% distortion. 3 milliwatts with 5% distortion.
7. Receiver De-emphasis	Standard 6 db per octave.
8. Antenna	Same as for transmitter.
9. Squelch	0.18 microvolt to open.
10. Power Requirements	Filament: 1.25 volts at 1.2 amps. Plate: 105 volts at 16 ma.
11. Tubes and Rectifiers	12 tubes and 2 germanium crystal diodes.

POWER SUPPLY AND AUDIO OUTPUT:

1. Power Input	6.3 or 12.6 volts DC (Power changeover accomplished as outlined on page 4).
2. Current Drain	at 6.3 V / at 12.6 V Receive - 5.5 amps / 2.9 amps Transmit - 6.7 amps / 3.8 amps
3. Output Voltages	Regulated +135 volts at 30 ma. Regulated +105 volts at 17 ma. Regulated +2 volts at 1.2 amps.
4. Audio Input Impedance	High Impedance
5. Built-in Speaker	4-inch PM; 3.2-ohm voice coil
6. Audio Output Impedance	500 ohms (for remote speaker)
7. Audio Output (built-in speaker)	1.0 watt
8. Tubes and Rectifiers	1 tube plus voltage regulator, current regulator, and selenium rectifier

WEIGHT: 14-3/4 lbs. with unit, mtg. bracket, and microphone.



NOTE
WHEN UNIT IS MOUNTED HORIZONTALLY, MICROPHONE AND HOLDER MOUNT ON TOP LEFT OF CASE AS INDICATED BY THE DOTTED LINES.

Fig. 13A. Side View of Unit Showing Dimensions

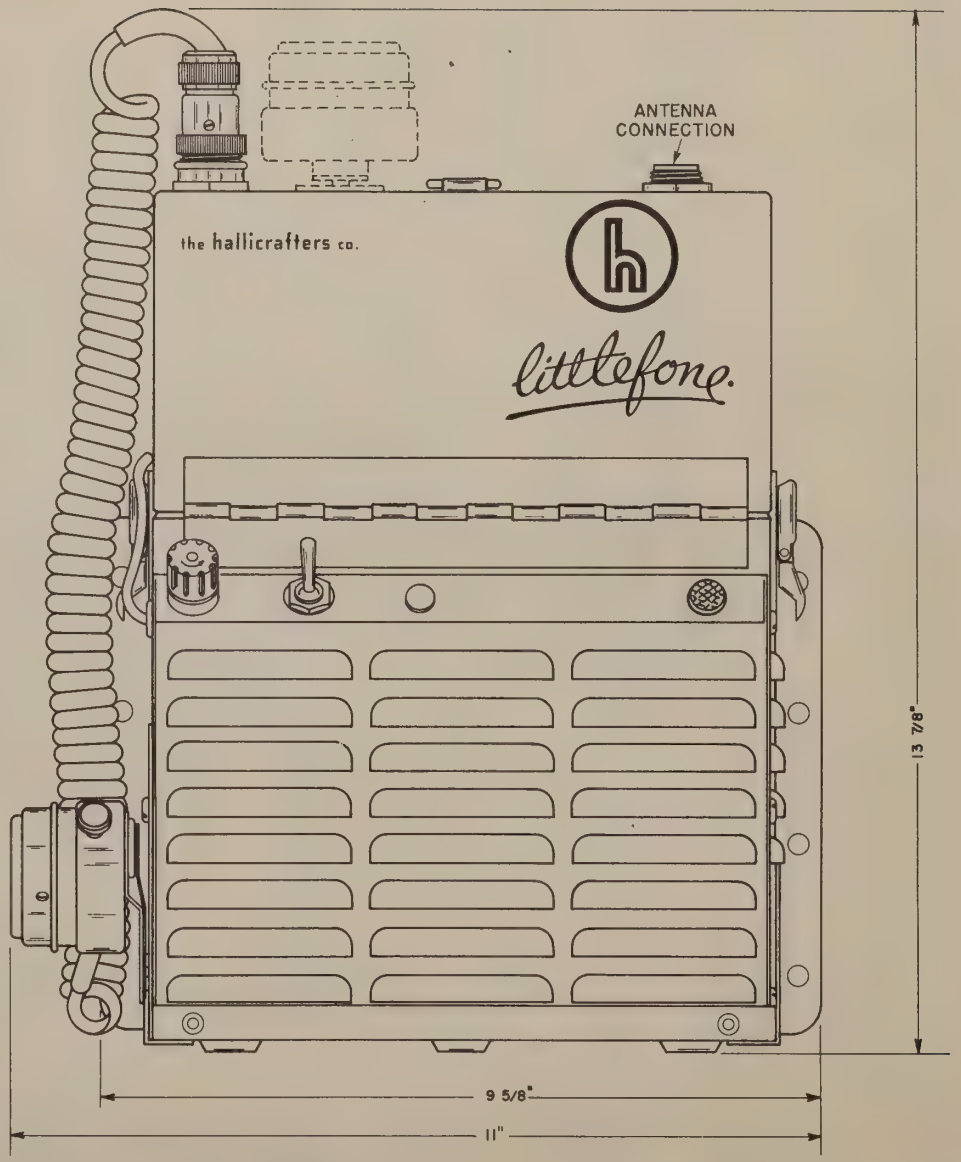


Fig. 13B. Front View of Unit Showing Dimensions

9202078

SERVICE PARTS LIST

Replacement parts may be obtained through Hallicrafters territorial and local distributors, or through Hallicrafters Service Division, 823 S. Tripp Avenue; Chicago 24, Illinois. When ordering parts, specify Hallicrafters Part Number and Description.

UPPER COMPARTMENT PARTS

(TRANSMITTER-RECEIVER CHASSIS)

Schematic Symbol	Description	Hallicrafters Part Number	Cross Reference
	CAPACITORS		
C-1,54,57	25 mmf. 500 V., ceramic	47A288	174-0008-00
C-2,3,4,5,27,48,49 66,67,88	.005 mfd. 450 V., ceramic disc.	47A168	174-0020-00
C-6,8,11,13,15,16, 25,31,33,38	.02 mfd. 400 V., tubular	47A277	173-5003-00
C-7,10,12	.1 mmf. wire gimmick.	----------	----------
C-9,22,23,90	.01 mfd. 450 V., ceramic disc.	47A217	174-0021-00
C-14,18,28,36,74	100 mmf. 500 V., ceramic	47X30UK101K	174-0017-00
C-17,35	1 mmf. 500 V., gimmick	47A160-2	174-0001-00
C-19	1.0 mmf. 500 V., gimmick (on sets with James Knight type H-17 crystal)	47A160-2	174-0001-00
C-19	4.7 mmf. 500 V., gimmick (on sets with JAN type CR-18/U crystal)	47A160-6	----------
C-20,26,37,45,52,53, 55,59,60	.002 mfd. 400 V., tubular	47A276	173-5000-00
C-21	500 mmf. 500 V., ceramic	47A278	174-0018-00
C-24,47,50,68,77,89	1000 mmf. 500 V., ceramic	47A280	174-0019-00
C-29	25 mmf. 500 V., ceramic	47A285	174-0010-00
C-30,39,40,42,43 44,85,86,87	10 mmf. 500 V., ceramic	47X20CK100F	174-0005-00
C-32,65,70	5 mmf. 500 V., ceramic	47A289	174-0022-00
C-41	5 mmf. 500 V., ceramic (operating freq. between 27-35MC)	47A289	174-0022-00
C-41	10 mmf. 500 V., ceramic (operating freq. between 25-27 MC)	47X20CK100F	174-0005-00
C-46	2.2 mmf. 500 V., gimmick	47A160-4	174-0002-00
C-51	250 mfd. 6 V., electrolytic.	45A201	170-0003-00
C-56,58,61,62,64 69,71,76	5, 10 or 15 mmf. 500 V., ceramic (see chart below for value)		
	5 mmf. 500 V., ceramic.	47A289	174-0022-00
	10 mmf. 500 V., ceramic.	47X20CK100F	174-0005-00
	15 mmf. 500 V., ceramic.	47B20150K	----------

Littlefone Operating Freq. (MC)	C56	C58	C61	C62	C64	C69	C71	C-76
25.00 - 29.5	-----	----	10	10	15	10	15	15
29.54 - 33.5	15	15	10	5	10	5	10	15
33.54 - 35.0	----	10	10	5	10	5	10	----
35.00 - 44.5	----	10	----	----	5	----	5	----
44.50 - 50.0	----	5	----	----	----	----	----	----

C-63	1 - 3.5 mmf. ceramic trimmer (buffer neutralizing capacitor)	47A287	171-0004-00
C-72	2.5 - 6 mmf. ceramic trimmer (final amp. neutralizing capacitor).	47A286	171-0005-00
C-73	2.5 - 13 mmf. ceramic trimmer (output tuning capacitor)	44A415	171-0001-00
C-75	10 - 100 mmf. ceramic trimmer (output loading capacitor).	44B414	171-0003-00
C-78,91	5 - 25 mmf. trimmer	44B430	----------
	RESISTORS		
R-1,12	1 megohm 1/2 watt, carbon	23X20X105K	160-0160-00
R-2,4,6,8,10,23,24 25,26,27,35,36,44	100,000 ohms 1/2 watt, carbon	23X20X104K	160-0136-00
R-3	1.03 ohms; #26 nichrome wire (5 inches)	87A2433	P-4649-1
R-5,14,16,17,18	560,000 ohms 1/2 watt, carbon	23X20X564K	160-0154-00
R-7,21,22,28,33,42	220,000 ohms 1/2 watt, carbon	23X20X224K	160-0145-00
R-9,15.40	150,000 ohms 1/2 watt, carbon	23X20X154K	160-0140-00
R-11	15,000 ohms 1/2 watt, carbon	23X20X153K	----------
R-13	10,000 ohms 1/2 watt, carbon (on sets with James Knight type H-17 crystal)	23X20X103K	160-0112-00
R-13	4700 ohms 1/2 watt, carbon (on sets with JAN type CR-18/U crystal)	23X20X472K	----------
R-19	270,000 ohms 1/2 watt, carbon	23X20X274K	----------

UPPER COMPARTMENT PARTS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number	Cross Reference
	RESISTORS (Cont.)		
R-20	Volume/squelch control; 1 megohm, center tapped	25B1032	----------
R-29,30,31	2200 ohms 1/2 watt, carbon	23X20X222K	----------
R-32	5 ohms 10 watts, adjustable wirewound	24A964	----------
R-37,38,41,43,45	47,000 ohms 1/2 watt, carbon	23X20X473K	160-0128-00
R-39	27 ohms 1/2 watt, carbon	23X20X270K	160-0001-00
R-47	470 ohms 1/2 watt, carbon	23X20X471K	----------
R-48	10,000 ohms 1/2 watt, carbon	23X20X103K	160-0112-00
R-49	.585 ohms; #26 nichrome wire (3-1/32 inches)	87A2434	P-4649-2
	COILS AND TRANSFORMERS		
L-1,2	Choke, RF	53B260	P-4648
L-3	Coil, final plate (operating freq. below 37 MC)	51B1522	P-4645-2
L-3	Coil, final plate (operating freq. above 37 MC)	51B1571	P-4645-3
T-1	Transformer, 1st RF	50C546	P-4636
T-2	Transformer, 2nd RF	50C547	P-4637
T-3,4,5	Transformer, 1st mixer, 1st IF, and 2nd IF	50C569	----------
T-6,7	Transformer, 2nd mixer and 3rd IF	50C536	P-4382
T-8	Transformer, discriminator	50C537	P-4383
T-9	Transformer, modulation and audio output	55C211	----------
T-10	Transformer, oscillator (receiver)	50C548	P-4638
T-12	Transformer, oscillator (transmitter)	50C549	P-4639
T-13	Transformer, modulator plate	50C550	P-4640
T-14	Transformer, 1st and 2nd multiplier	50C551	P-4641
T-15	Transformer, 3rd multiplier	50C552	P-4642
T-16	Transformer, 4th multiplier	50C553	P-4643
T-17	Transformer, buffer	50C554	P-4644
	PLUGS AND SOCKETS		
PL-1	Plug and cable assembly, power supply	87B3679	----------
PL-2	Plug, microphone (part of microphone MI-1)	----------	----------
PL-3	Plug, audio output; single pin (black)	35A027	----------
SO-2	Socket, microphone	10A491	145-0003-00
SO-3	Socket, antenna	10A490	P-4261
	Socket, crystal	6A417	141-0012-00
	Socket, tube; 6 pin	6A418	141-0006-00
	Socket, tube; 5 pin	6A419	141-0004-00
	TUBE COMPLEMENT		
V-1,10,11,18	1AD4: 1st RF amplifier, audio amplifier, oscillator (receiver) and 3rd multiplier	90X1AD4	140-0002-00
V-2,3,4,5,6,7,8,9, 16,17	CK5678: 2nd RF amplifier, 1st mixer, 1st IF amplifier, 2nd IF amplifier, 2nd mixer, 3rd IF amplifier, 1st limiter, 2nd limiter, 1st multiplier, and 2nd multiplier	90XCK5678	140-0015-00
V-12	1AJ5 (1AG5/2E41): squelch	90X1AJ5	----------
V-13,14,15	CK5672: oscillator (transmitter), modulators	90XCK5672	140-0013-00
V-19	CK5676: 4th multiplier	90XCK5676	140-0014-00
V-20,21,22	6029/573AX: buffer, final amplifiers	90X6029/573AX	140-0012-00
	MISCELLANEOUS PARTS		
	Antenna assembly (complete with cable, connectors and mtg. hdwe.)	57D164	----------
	Button plug	17A123	123-0006-00
GR-1,2	Crystal diode, germanium	19A1879	149-0005-00
*X-1	Crystal, receiver; JAN type CR-18/U (specify frequency)	19B1887	----------
*X-1	Crystal, receiver; James Knight type H-17 (specify frequency)	19B1880	Knight Type H-17
*X-2	Crystal, transmitter; JAN type CR-18/U (specify frequency)	19B1888	----------
*X-2	Crystal, transmitter; James Knight type H-17 (specify frequency)	19B1881	Knight Type H-17
	Dial plate, Volume/Squelch control	13B1109	----------
	Gasket, rubber; 5/16" id, 9/16" od	12A067	P-4260-1
	Gasket, rubber; 47/64" id, 1-1/8" od	12A068	P-4260-2
	Gasket, rubber; 39/64" id, 51/64" od	12A069	P-4260-4
	Knob, Volume/Squelch control	15A502	126-0001-00
	Latch, case (upper section)	30A248	P-4276-1
MI-1	Microphone (includes cord and plug)	81B090	----------
	Operating and Service Instruction Book	94X1161	----------
	Pin, hinge	74A554	P-4702-3
RY-1	Relay	21B139	150-0001-00
	Ring, retaining; for mtg. 6 pin tube sockets	76A917	130-0004-00
	Ring, retaining; for mtg. 5 pin tube sockets	76A918	130-0003-00
	Top compartment of case	66C824	P-4758

* See crystal type and frequency marked on crystal.

LOWER COMPARTMENT PARTS

(POWER SUPPLY CHASSIS)

Schematic Symbol	Description	Hallicrafters Part Number	Cross Reference
	CAPACITORS		
C-101	.005 mfd. 450 V., ceramic disc	47A168	174-0020-00
C-102	10 mfd. 25 V., electrolytic	45A121	----------
C-103	.004 mfd. 1600 V., oil filled tubular	46A195	----------
C-104,110	.5 mfd. 100 V., tubular	46A196	173-0005-00
C-105	20-20 mfd. 250 V., electrolytic	45A202	170-0002-00
C-106,107,108,113	.0015 mfd. 500 V., ceramic feed-thru.	47B382	----------
C-109	Spark plate (see Miscellaneous Parts for part numbers of mica insulators)	----------	----------
C-111	5000 mfd. 10 V., electrolytic	45B205	P-4788
C-112	250 mfd. 6 V., electrolytic	45A201	----------
	RESISTORS		
R-101	470,000 ohms 10%, 1/2 watt; carbon.	23X20X474K	----------
R-102	390 ohms 10%, 1/2 watt; carbon	23X20X391K	----------
R-103	10,000 ohms 10%, 1 watt; carbon	23X30X103K	----------
R-104	39 ohms 10%, 2 watt; carbon.	23X40X390K	----------
R-105	100,000 ohms 10%, 1/2 watt; carbon.	23X20X104K	160-0136-00
	COILS AND TRANSFORMERS		
L-101	Choke, RF; 2.9 uh, 12 amps	53A261	----------
T-101	Transformer, audio output (part of speaker LS-101)	----------	----------
T-102	Transformer, vibrator	52C254	----------
	PLUGS AND SOCKETS		
J-101	Jack, audio input; black	6A479	----------
J-102	Jack, meter; red	6A424	141-0001-00
PL-101	Plug, meter; red	35A023	144-0001-00
	Socket, lamp	86A148	----------
SO-102	Socket, power supply output; 4 pin	6A426	P-4756-1
	Socket, tube; miniature 7 pin	6A483	----------
	Socket, tube; octal	6B296	----------
SO-101	Socket, vibrator	6A084	----------
	TUBES AND RECTIFIERS		
V-101	6AK6: audio output	90X6AK6	----------
V-102	OB2: voltage regulator	90X0B2	----------
V-103	12-3: current regulator.	90X12-3	----------
SR-101	Rectifier, selenium; dual section @ 1.5 amps	27B188	----------
	MISCELLANEOUS PARTS		
	Bottom compartment of case	66C917	----------
	Button plug	17A123	123-0006-00
	Clip, vibrator mtg.	76B1087	----------
	Fastener, spring; female (for locking case in mtg. bkt.)	76B1095	----------
F-101	Fuse, 10 amp 250 V.; type 3AG (for 6 volt operation).	39A380	----------
F-101	Fuse, 8 amp. 250 V.; type 3AG (for 12 volt operation).	39A365	----------
	Grommet, rubber; 3/16" id x 7/16" od	16A012	----------
	Grommet, rubber; 5/32" id x 7/16" od (for power lead).	16A018	----------
	Grommet, rubber: (for remote sprk. lead opening)	16A050	----------
	Holder, fuse	6A451	----------
	Insulator, mica; 2-1/16" x 1-3/4" (part of spark plate C-109)	8A2146	----------
	Insulator, mica; 1-11/16" x 1-11/16" (part of spark plate C-109).	8A2147	----------
	Jewel	86A140	----------
LM-101,102,103	Lamp, type 6S6-115; 6 watt, 115 volt; candelabra base.	39A002	----------
	Latch, case (lower section)	30A249	P-4276-2
	Microphone holder	41X23047	----------
LS-101	Speaker, 4-inch PM; includes output transformer T-101	85C149	----------
S-101	Switch, on-off; spst toggle	60A484	138-0001-00
MV-101	Vibrator (6 volt).	27B187	----------
MV-101	Vibrator (12 volt).	27B108	----------

MOUNTING BRACKET PARTS

	Bumper, rubber	16A399	----------
	Mounting bracket	67D1936	----------
	Pin (for wing-head fastener).	74A601	----------
	Retainer, spring.	76A1090	----------
	Wing-head fastener (less pin)	73A844	----------

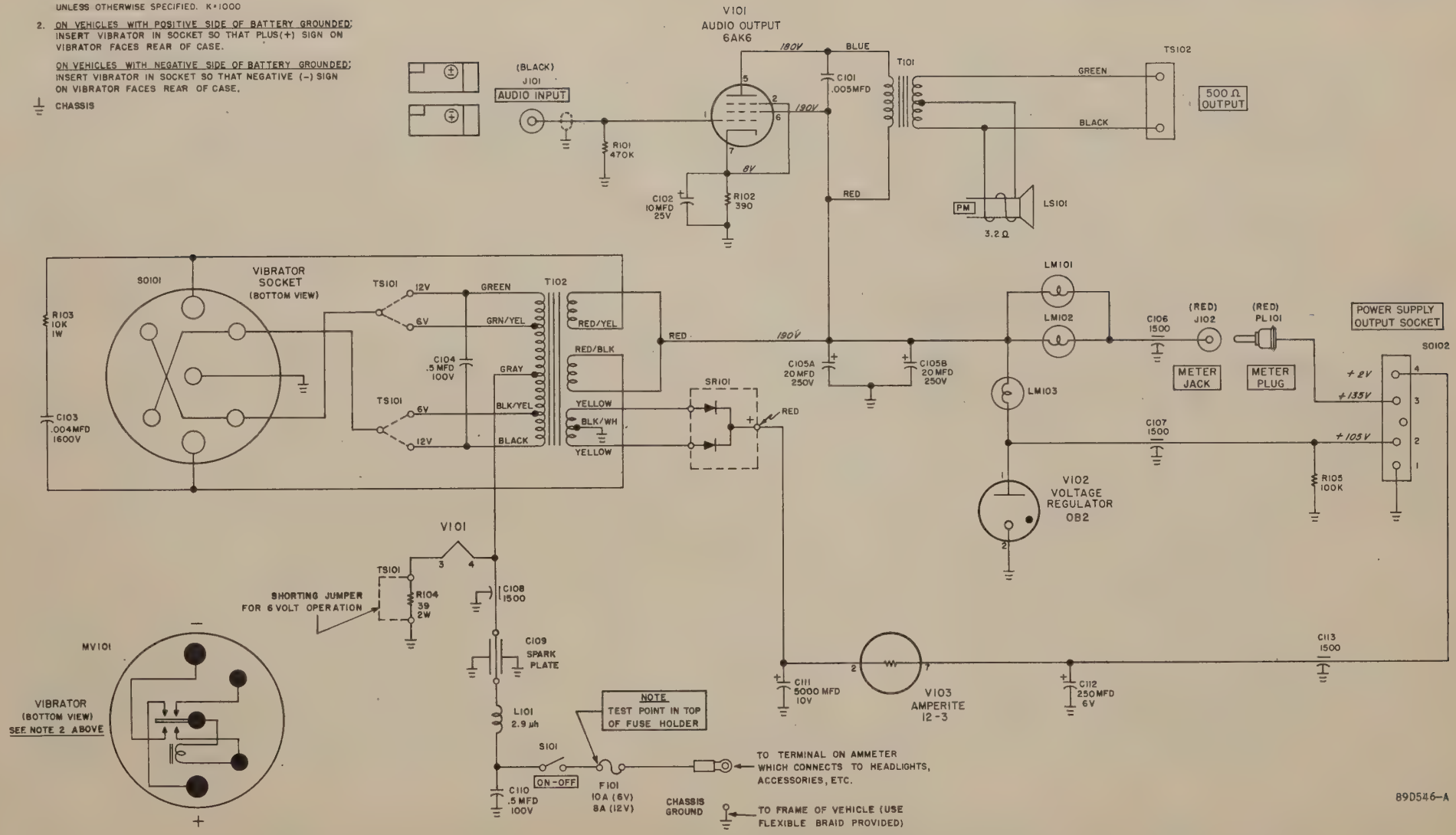
MODEL HT-25
RUN 1
(POWER SUPPLY & AUDIO OUTPUT)

NOTES:

1. RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED. K=1000
2. ON VEHICLES WITH POSITIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT PLUS(+) SIGN ON VIBRATOR FACES REAR OF CASE.

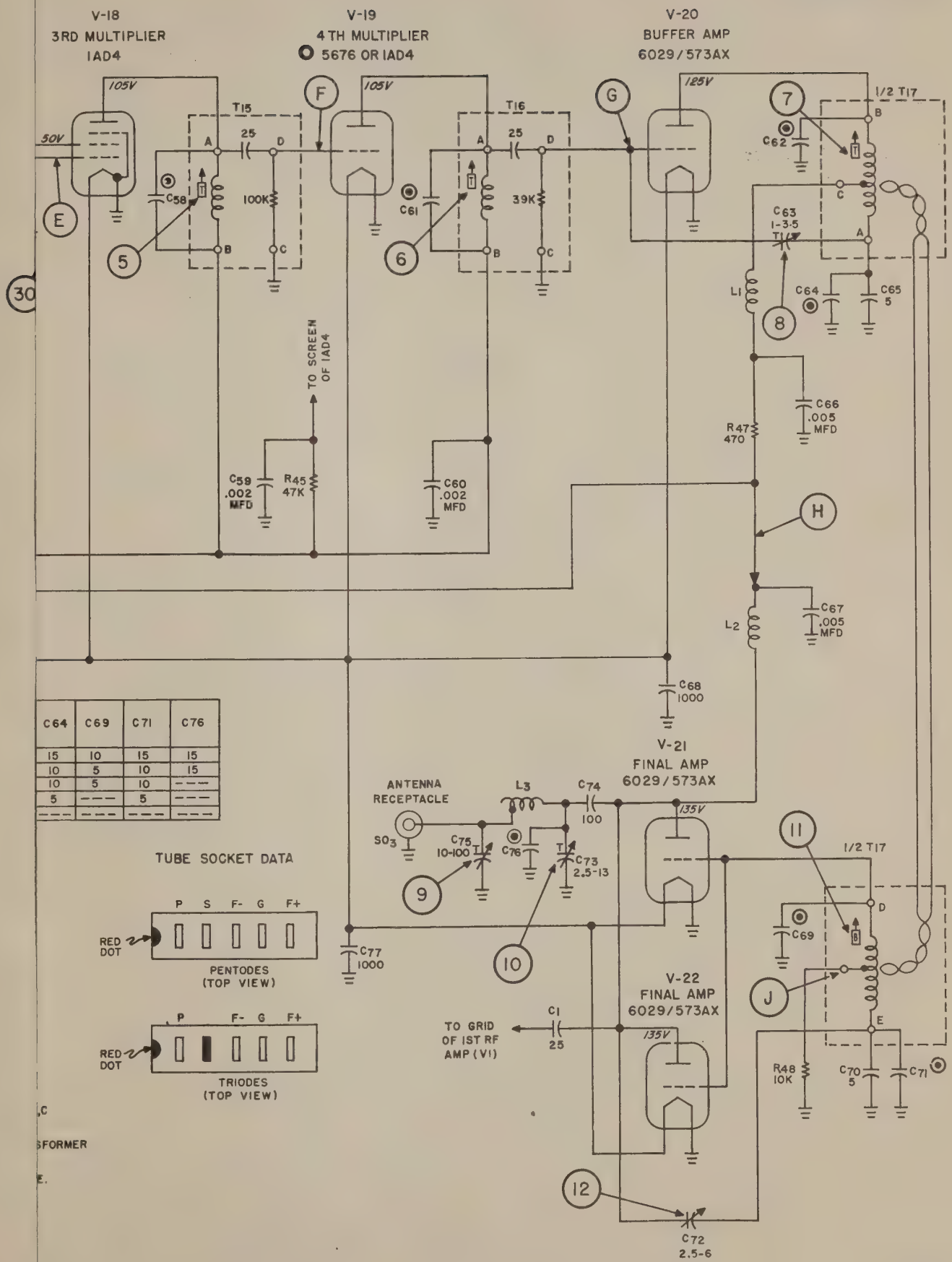
   ON VEHICLES WITH NEGATIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT NEGATIVE (-) SIGN ON VIBRATOR FACES REAR OF CASE.

⏚ CHASSIS



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

MODEL HT-25
RUN 1
(TRANSMITTER)



C64	C69	C71	C76
15	10	15	15
10	5	10	15
10	5	10	---
5	---	5	---
---	---	---	---

TUBE SOCKET DATA

,C

SFORMER

E.

89E546-A

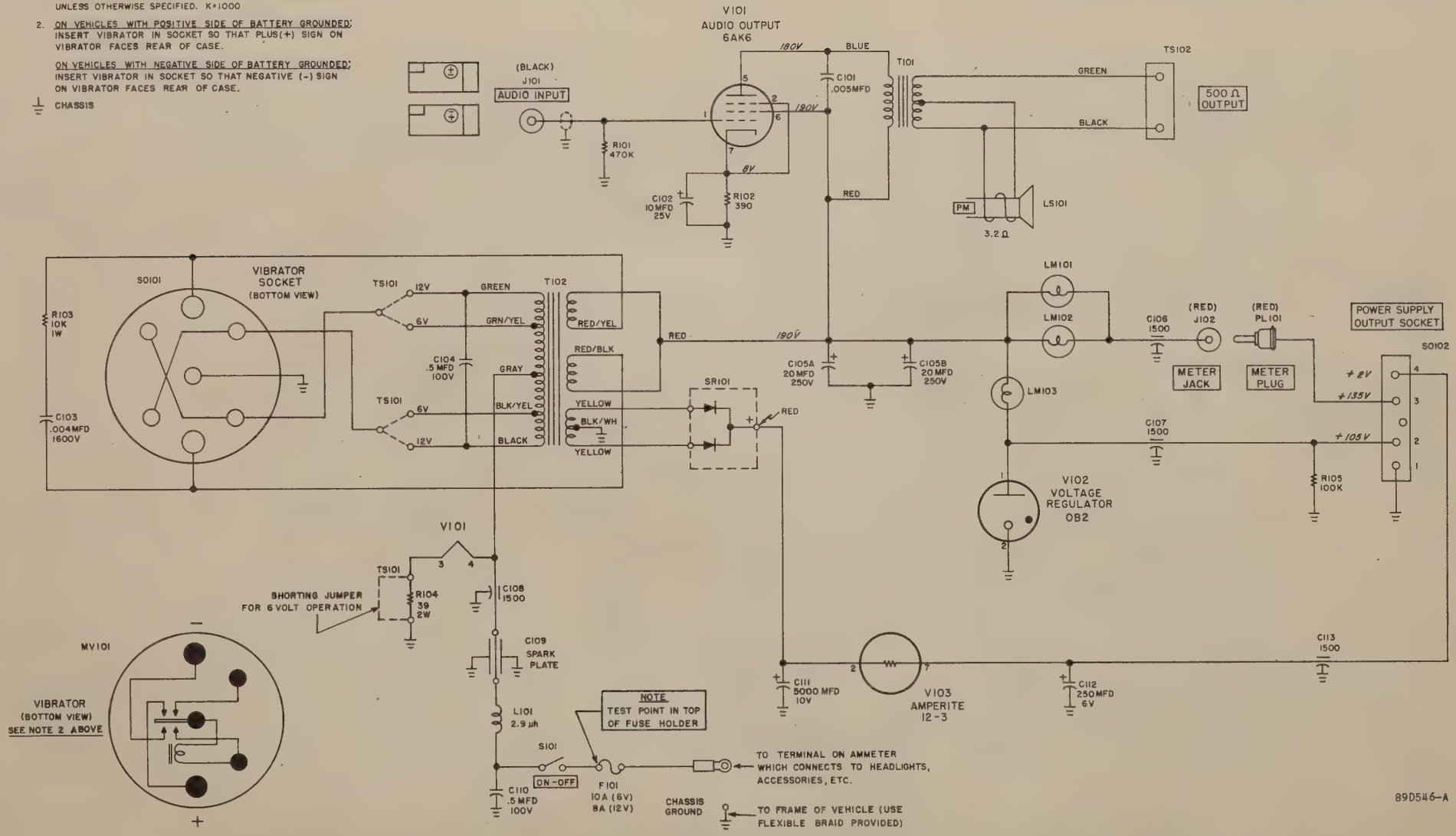
MODEL HT-25
RUN 1
(POWER SUPPLY & AUDIO OUTPUT)

NOTES

1. RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED. K=1000
2. ON VEHICLES WITH POSITIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT PLUS(+) SIGN ON VIBRATOR FACES REAR OF CASE.

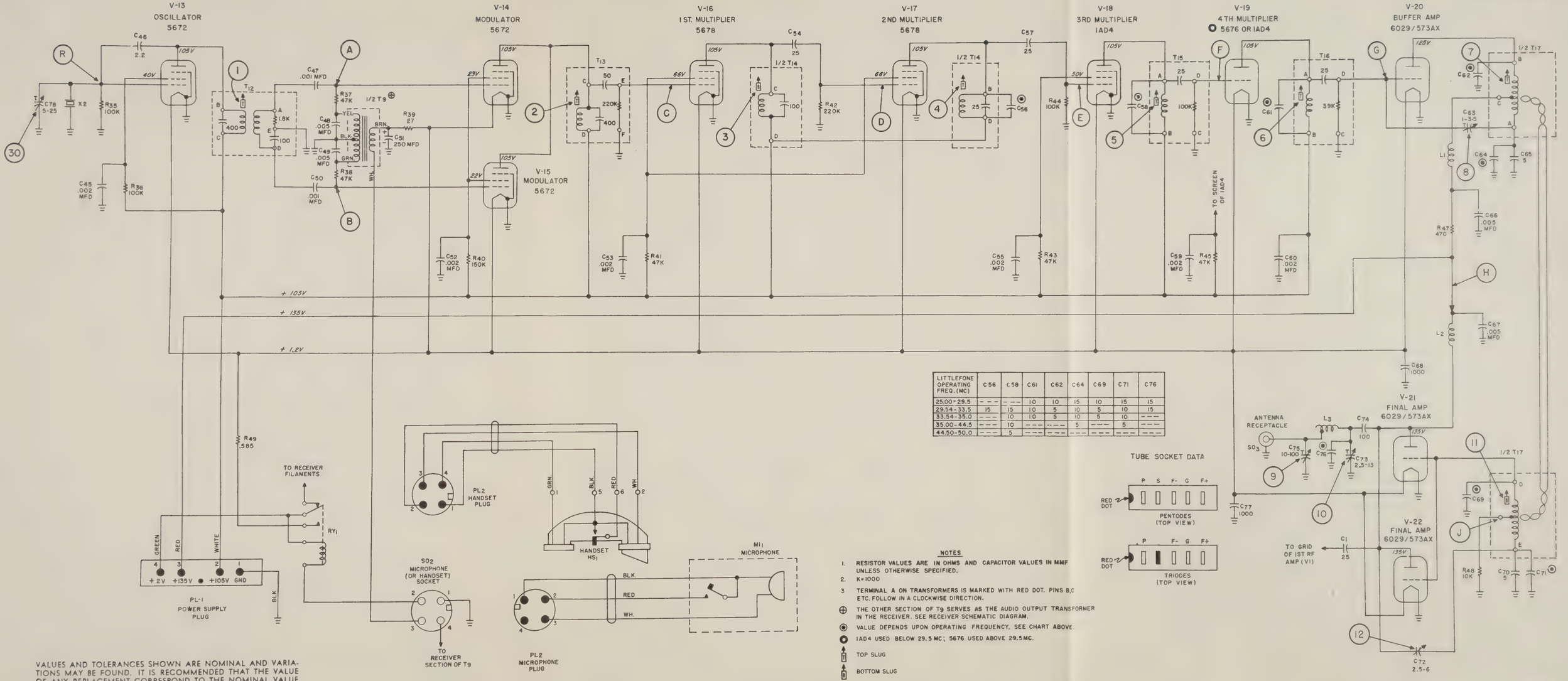
   ON VEHICLES WITH NEGATIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT NEGATIVE (-) SIGN ON VIBRATOR FACES REAR OF CASE.

⏚ CHASSIS



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

MODEL HT-25
RUN 1
(TRANSMITTER)



LITTLEFONE OPERATING FREQ.(MC)	C56	C58	C61	C62	C64	C69	C71	C76
25.00-29.5	---	---	10	10	15	10	15	15
29.54-33.5	15	15	10	5	10	5	10	15
33.54-35.0	---	10	10	5	10	5	10	---
35.00-44.5	---	10	---	---	5	---	5	---
44.50-50.0	---	5	---	---	---	---	---	---

NOTES

1. RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED.
2. K=1000
3. TERMINAL A ON TRANSFORMERS IS MARKED WITH RED DOT. PINS B,C ETC. FOLLOW IN A CLOCKWISE DIRECTION.

⊕ THE OTHER SECTION OF T9 SERVES AS THE AUDIO OUTPUT TRANSFORMER IN THE RECEIVER. SEE RECEIVER SCHEMATIC DIAGRAM.

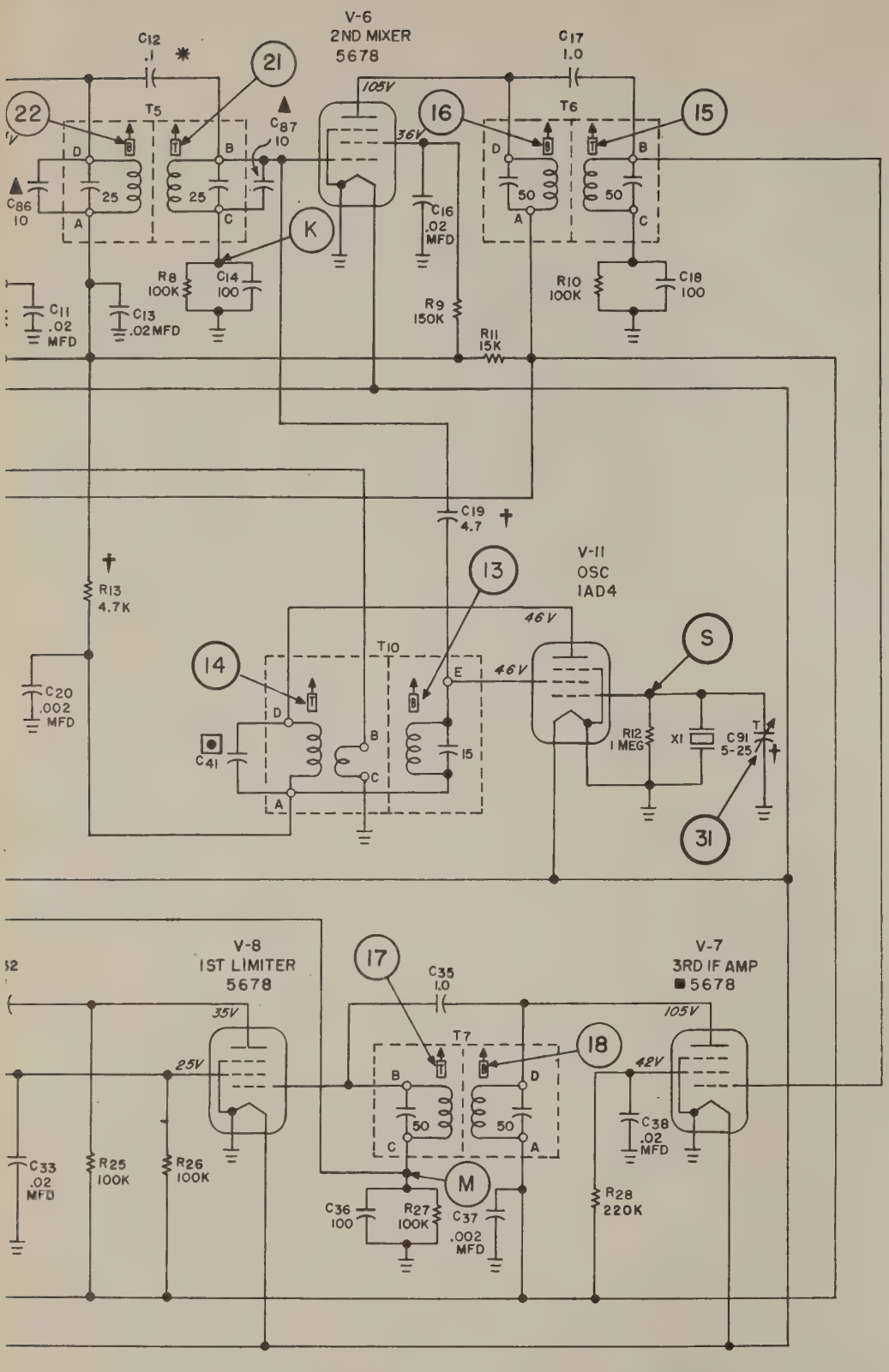
◉ VALUE DEPENDS UPON OPERATING FREQUENCY. SEE CHART ABOVE.

⊙ 1AD4 USED BELOW 29.5 MC; 5676 USED ABOVE 29.5MC.

TOP SLUG

BOTTOM SLUG

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.



TING FREQ. BETWEEN 25-29.7MC AND 36-38MC.

EEN 25-27MC; 5MMF ON MODELS OPERATING
E 35MC.

PE H-17 CRYSTAL, C-91 IS DELETED, R13 IS 10K,
YPES" ON PAGE 12).

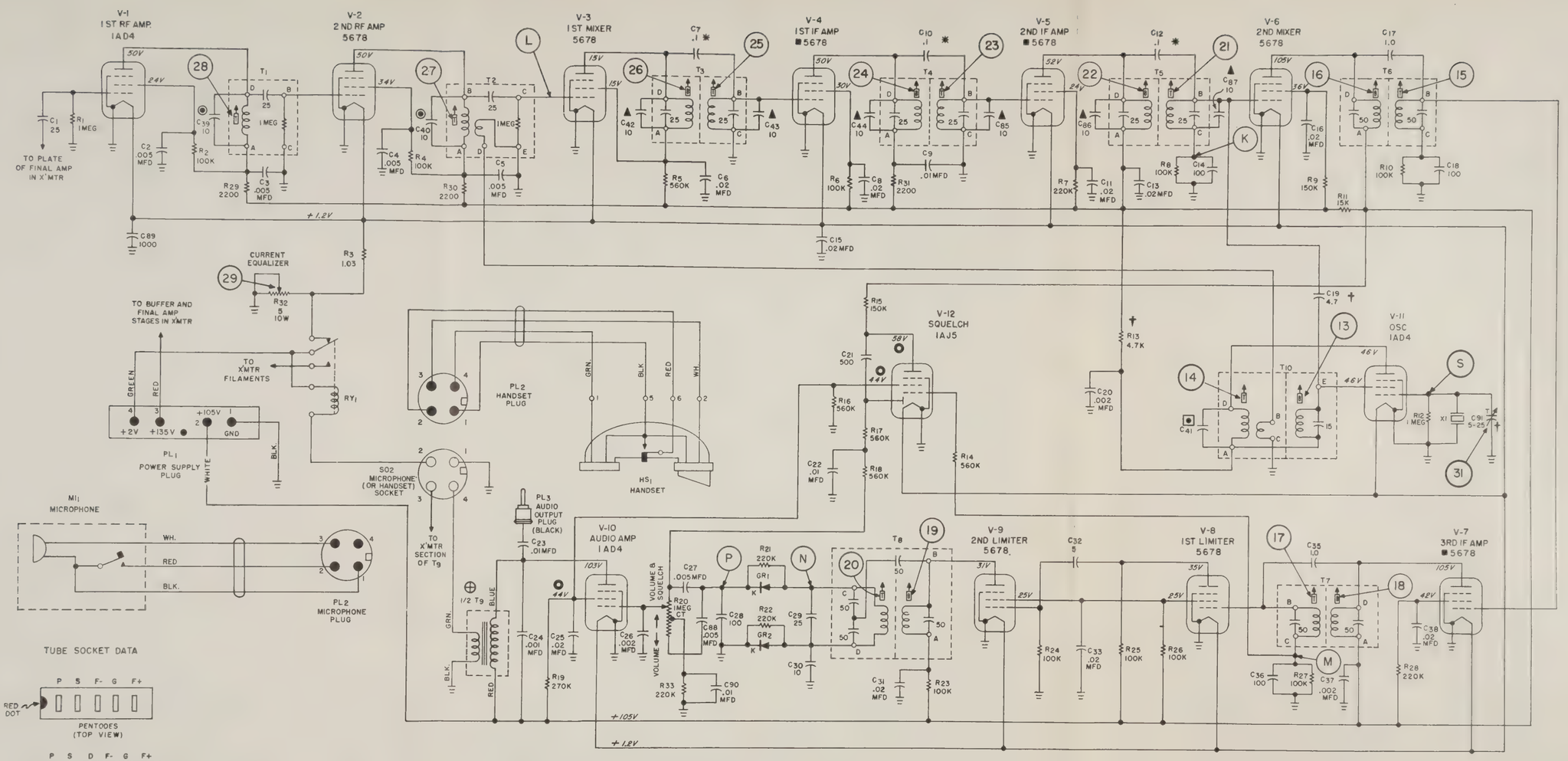
TUBES WERE SUBSTITUTED FOR TYPE 5678
KING REPLACEMENT ON THESE SETS, EITHER
BLE USE THE SAME TUBE TYPE FOUND IN THE
WITH TYPE 5678, IT MAY BE NECESSARY TO
)F THE GIMMICK CAPACITOR IN THE PLATE
ACED TO PREVENT OSCILLATION CAUSED BY
E 5678. DO NOT USE TYPE 2E32 TO REPLACE

1 ST IF = XTAL FREQ – 1.7 MC
2ND IF = 1.7 MC

89E547-A

NOTES

MODEL HT-25
RUN 1
(RECEIVER)



1. TERMINAL A ON TRANSFORMERS IS MARKED WITH RED DOT. PINS B,C, ETC. FOLLOW IN A CLOCKWISE DIRECTION.
2. RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED.
3. K=1000
- ✱ GIMMICK
- ⊕ THE OTHER SECTION OF T9 SERVES AS A MODULATION TRANSFORMER IN THE TRANSMITTER. SEE TRANSMITTER SCHEMATIC DIAGRAM.
- ⊙ WITH VOLUME/SQUELCH CONTROL SET FULLY CLOCKWISE.
- ◉ USED ONLY ON MODELS WITH OPERATING FREQUENCY BELOW 35MC.
- ▯ TOP SLUG
- ▯ BOTTOM SLUG

- ▲ USED ONLY ON MODELS WITH OPERATING FREQ. BETWEEN 25-29.7MC AND 36-38MC.
- ▣ 10MMF ON MODELS OPERATING BETWEEN 25-27MC; 5MMF ON MODELS OPERATING BETWEEN 27-35 MC. NOT USED ABOVE 35MC.
- † ON MODELS WITH JAMES KNIGHT TYPE H-17 CRYSTAL, C-91 IS DELETED, R13 IS 10K, AND C19 IS 1.0 MMF. (SEE "CRYSTAL TYPES" ON PAGE 12).
- ■ NOTE: ON SOME SETS, TYPE 2E32 TUBES WERE SUBSTITUTED FOR TYPE 5678 FOR V-4, V-5, AND V-7. WHEN MAKING REPLACEMENT ON THESE SETS, EITHER TUBE TYPE MAY BE USED. IF POSSIBLE USE THE SAME TUBE TYPE FOUND IN THE SET. WHEN REPLACING TYPE 2E32 WITH TYPE 5678, IT MAY BE NECESSARY TO SLIGHTLY LOOSEN THE COUPLING OF THE GIMMICK CAPACITOR IN THE PLATE CIRCUIT OF THE TUBE BEING REPLACED TO PREVENT OSCILLATION CAUSED BY THE SLIGHTLY HIGHER GAIN OF TYPE 5678. DO NOT USE TYPE 2E32 TO REPLACE TYPE 5678.

1ST IF = XTAL FREQ – 1.7 MC
2ND IF = 1.7 MC

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89ES17-A

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X1161
853 – RUN 1

hallicrafters

littlefone

2-WAY FM RADIO-TELEPHONE
144-174 MC

OPERATING and SERVICE INSTRUCTIONS

HT-26

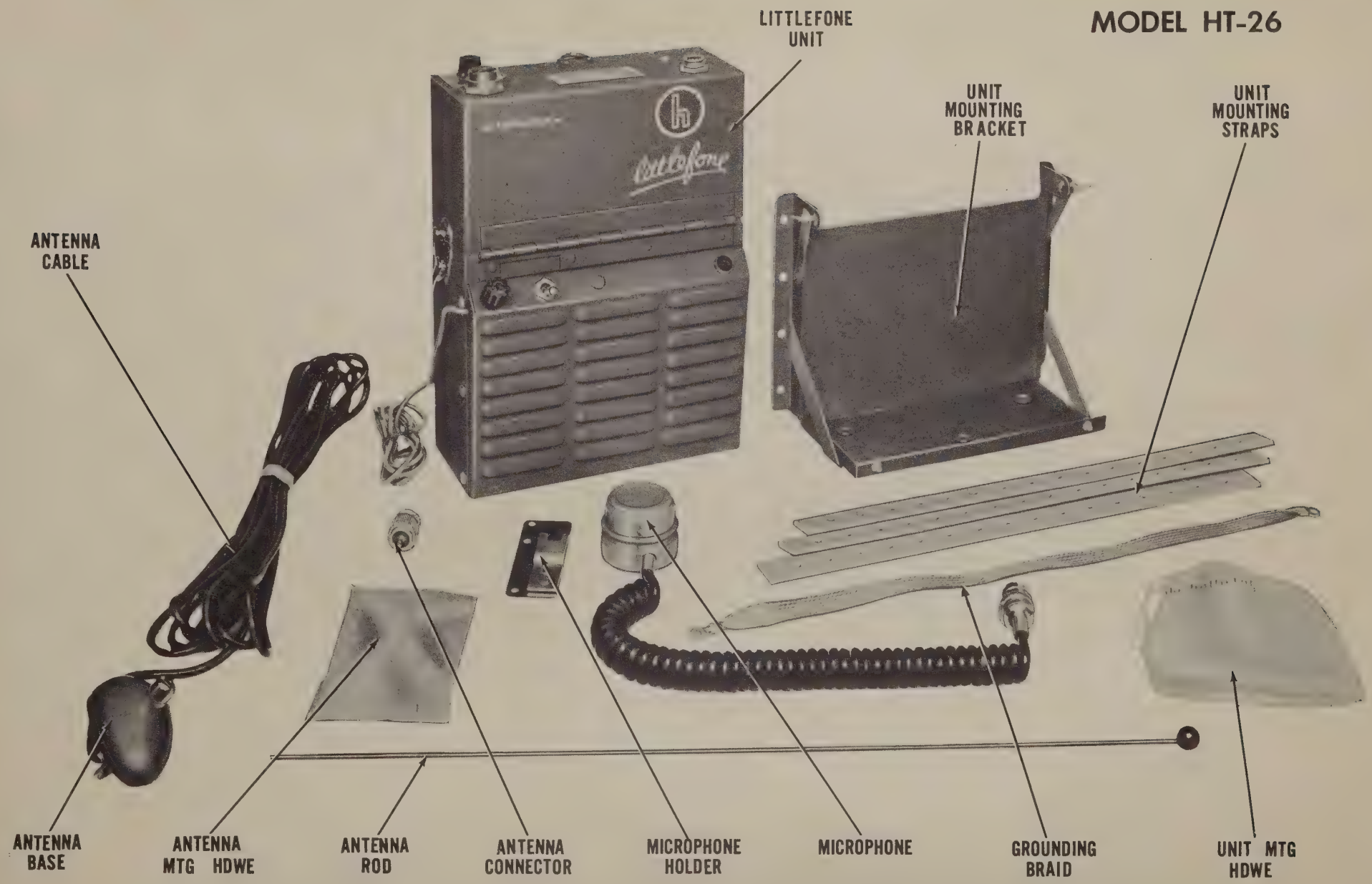
RUN 1

the hallicrafters co.

MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

"LITTLEFONE" MOBILE UNIT

MODEL HT-26



92X2109

GENERAL DESCRIPTION

The HT-26 "Littlefone" is a completely self-contained 2-way FM radiotelephone for use in mobile vehicles equipped with 6 or 12 volt electrical systems. It operates on a single fixed frequency in the 144 to 174 MC range and has a radio-frequency power output of 1.0 watt. The unit is designed primarily for use with "Littlefone" portable and central station equipment or for communication with other mobile units, but may also be tied in with existing higher powered FM equipment. The unit comes fully equipped with a whip antenna (complete with cable and connector), hand microphone, built-in 4-inch PM speaker, mounting bracket, and necessary mounting hardware. Provisions are also included for connecting a remote speaker.

The FM transmitter and receiver are contained on a common chassis located in the upper section of the case while the audio output circuit and vibrator power supply are contained on a second chassis located in the lower section. All electrical connections between the two chassis are made with plugs and sockets, and each chassis is easily removable for service. A built-in squelch circuit quiets the receiver when no signals are being received. This feature plus the fact that an FM system is being employed assures virtually noise-free reception.

Where a tunable stationary receiving station is desired, use the economical Hallicrafters Model S-81 Receiver which tunes from 152 to 173 megacycles.

IMPORTANT

It is the requirement of the Federal Communications Commission that this radio equipment be licensed. The appropriate license application form (F.C.C. Form 400) can be obtained upon request from the Federal Communications Commission, Washington 25, D.C. or your local F.C.C. field office. All Littlefone equipment is on the Commission's "List of Equipments Acceptable for Licensing". The technical information requested in sections 1(d) and 1(e) of Form 400 should be filled out as follows: Emission - F3; Maximum permissible power input - 3.0 watts. Form 400 should be submitted to the Federal Communications Commission, Washington 25, D. C.

STANDARD EQUIPMENT SUPPLIED WITH UNIT

1. Transmitter, receiver, and power supply in weather-resistant metal case. Complete with tubes, crystals, and vibrator.
2. Mounting bracket for mounting case to dash, floor, or other convenient operating location.
3. Installation mounting straps (3)
4. Installation mounting hardware (packed in cloth bag)
5. Hand microphone
6. Microphone holder for case or dash mounting.
7. 18" Flexible braid for grounding case to vehicle.
8. Antenna, 20 feet of RG-58/U cable (with connector), and mounting hardware.

ACCESSORIES

Order parts by Hallicrafters Part Number and Description

Description	Hallicrafters Part Number	Cross Reference
Telephone handset, complete with cord and plug.	41X18708. . . .	P-4197
Holder for telephone handset	41X23023. . . .	----------

INSTALLATION INSTRUCTIONS

LOCATION AND MOUNTING - The unit may be mounted under the dash, on the floor or firewall, on the rear wall of a truck cab, or any other convenient operating location, using the "L" shaped mounting bracket supplied. The unit is held securely in this bracket by means of two wing head fasteners, one on each side of the bracket. To remove the unit for service, it is simply necessary to loosen the two fasteners, tilt the unit downward slightly, and then lift it out of the bracket.

Mount the bracket in the vehicle either by means of the three mounting straps provided, or by fastening it directly to the vehicle. Drill all mounting holes with a 7/32" drill and use the #10 machine screws and nuts (in cloth bag) to mount the bracket. Fig. 3 shows a typical "under-dash" installation.

Mount the microphone holder, supplied with the unit, to the case, dash, or other convenient location. The holder may be mounted on the case either by the bottom two screws at the left side of the case, or by the two screws on the left top of the case. To mount the holder on the dash, use two #8 self-tapping or machine screws.

POWER SOURCE - The unit is wired at the factory for operation on either a 6 or 12 volt DC electrical system with either a positive or negative ground as specified by the customer (see tag attached to side of case). If the electrical system of the vehicle in which the unit is being installed corresponds to the tag, no electrical changes are required and it is simply necessary to connect the unit to the power source as outlined below.

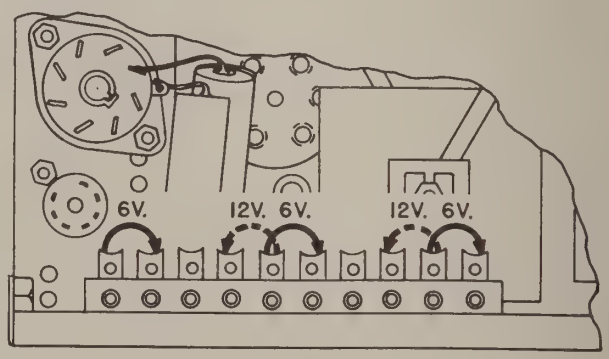
CONNECTIONS TO POWER SOURCE

1. Connect power lead, at side of case, to terminal on ammeter which connects to headlights, accessories, etc. so that current drawn by unit will be indicated on ammeter.
2. Ground "Littlefone" case to vehicle with 18-inch length of flexible braid provided. (#8 lug on braid connects to any one of three screws at side of case; #10 lug connects to vehicle with screw and nut provided in cloth bag.) See Fig. 3.

POWER CHANGEOVER

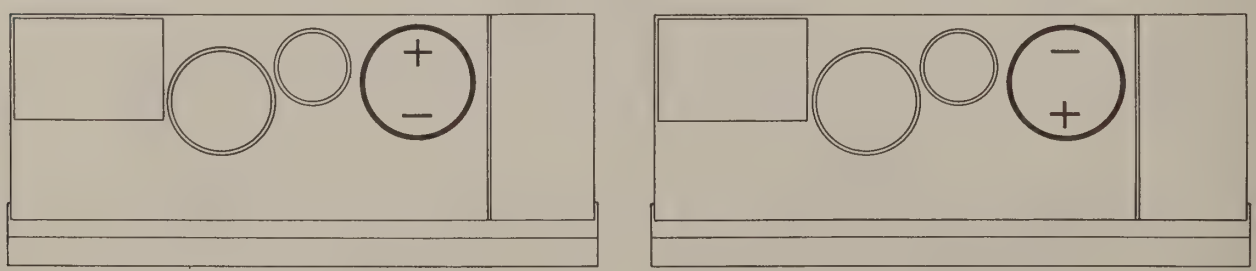
1. To change from 6 to 12 volt operation (or 12 to 6 volt operation), it will be necessary to replace the vibrator (Part No. 27B187 for 6 volts and Part No. 27B108 for 12 volts) and to change the positions of the jumpers on terminal strip TS-101 as shown in Fig. 1.

2. On vehicles with positive side of battery grounded, insert vibrator so that plus (+) sign on vibrator faces rear of case. Conversely, on vehicles with negative side of battery grounded, insert vibrator so that negative (–) sign on vibrator faces rear of case. (See Fig. 2.)



92B2076

Fig. 1. Bottom View of Power Supply Chassis Showing Power Changeover Connections



FOR VEHICLES WITH POSITIVE GROUND

FOR VEHICLES WITH NEGATIVE GROUND

92B2110

Fig. 2. Vibrator Polarity Adjustment

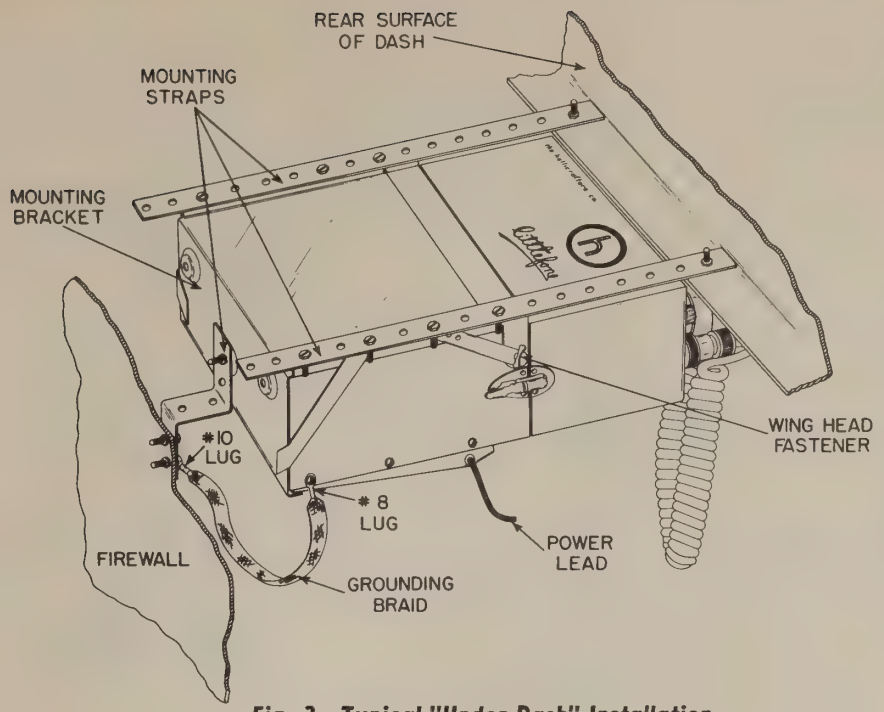


Fig. 3. Typical "Under-Dash" Installation

ANTENNA - The 20-inch whip antenna supplied with the unit is designed for roof-top mounting. Installation of the antenna does not require removing the upholstery from the interior of the vehicle. A single 7/8" hole drilled from the outside of the vehicle permits installation of the antenna mounting and snaking of the antenna lead to the "Littlefone". The antenna comes complete with 20 feet of RG-58/U coaxial cable and a connector. Before installing the antenna, cut it to proper length as outlined below.

CUTTING THE ANTENNA

1. Using heavy duty cutting pliers or hack saw, cut the lower end of the antenna rod to the length shown in Fig. 4.

INSTALLING THE ANTENNA

1. Follow the mounting instructions given in Fig. 5, locating the antenna in approximately the center of the roof top to obtain a uniform radiation pattern. Tape, use grommets, or otherwise protect the cable wherever it passes through a hole in the body.
2. Cut off the excess cable and connect the coaxial plug, supplied with the antenna, to the cable as shown in Fig. 4a.
3. Attach the coaxial plug to the antenna connector on the "Littlefone".

FINAL ADJUSTMENTS

1. Since the output tuning and loading adjustments for the final amplifier will vary with each installation, depending upon proximity of antenna to car body, it will be necessary to readjust the output tuning and loading adjustments at the time of installation. This is accomplished as follows:
   - A. Install the unit in the vehicle and connect the antenna.
   - B. Connect a DC milliammeter (0-50 ma) between the red, single pin plug and jack on the top of the power supply chassis (lower chassis).
   - C. Remove the button plugs from the right side of the case to gain access to the two adjustments (9 and 10 on Fig. 11).
   - D. Set 9 (output loading capacitor) for maximum capacity as shown in Fig. 11. Adjust 10 (output tuning capacitor) for resonance as indicated by minimum plate current. Then decrease the value of 9 in small steps, each time retuning 10 for minimum plate current. Proper operation with rated power output is obtained with a plate current reading of approximately 40 ma.

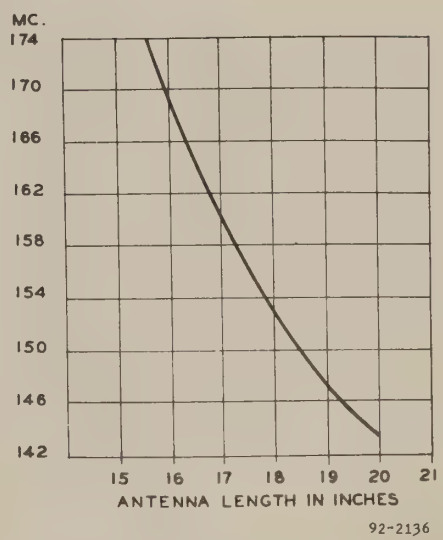


Fig. 4. Antenna Length Cutting Chart

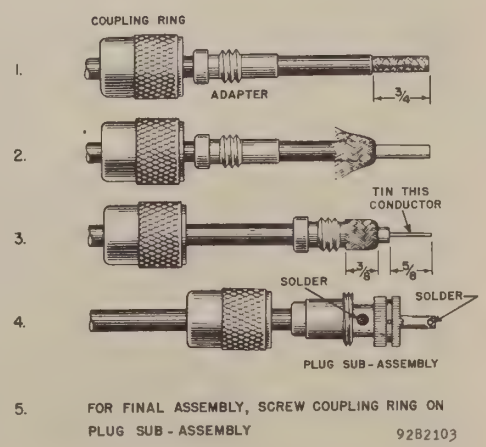


Fig. 4a. Coaxial Plug Connections

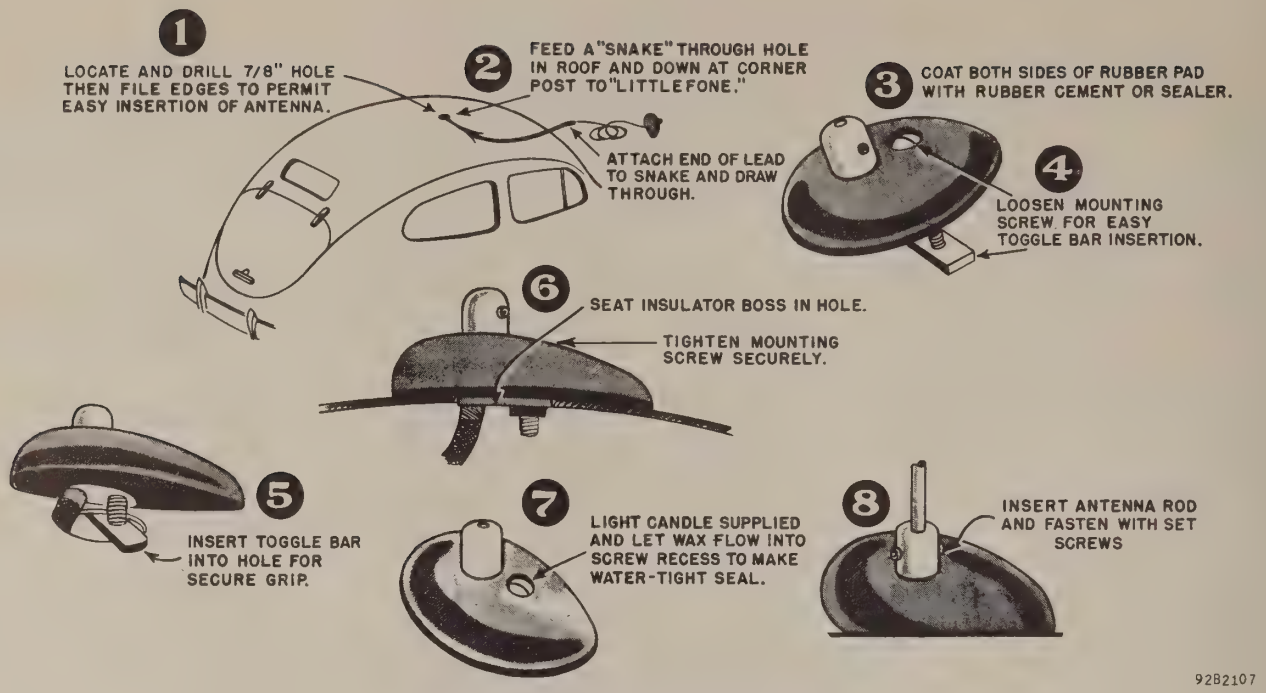


Fig. 5. Antenna Mounting Instructions

REMOTE SPEAKER CONNECTIONS- The 500-ohm output terminals for connecting a remote speaker are located on the frame of the built-in speaker (see Fig. 9). To connect the remote speaker, first remove the button plug on the front panel and insert the rubber grommet provided in the cloth bag. The grommet will accommodate two #22 (or smaller) insulated leads. The connections to the remote speaker are as shown in Fig. 6. The leads to the remote speaker should be knotted on the inside of the "Littlefone" case to act as a strain relief. In installations where the unit may be exposed to the weather, carefully weatherproof the lead opening in the front panel.

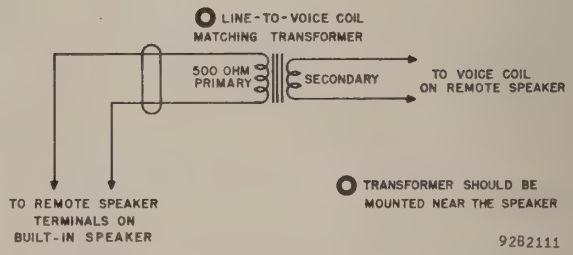


Fig. 6. Remote Speaker Connections

OPERATING INSTRUCTIONS

To operate the "Littlefone", place the power switch on the front panel of the case in the "on" position (up). The red jewel on the front panel will glow, indicating the unit is operating. Allow about one minute for the tubes to reach operating temperature and then rotate the VOLUME/SQUELCH control on the top of the case clockwise from the "MIN" position until the noise just disappears. (This adjustment is made with no signal input.) With the control set clockwise past "MIN", the squelch control is in operation to quiet the receiver when no signals are being received.

Since the setting of the VOLUME/SQUELCH control affects the audio intelligence on a weak signal (signal may sound choppy and distorted), it may be desirable when operating at the extreme range or "fringe area" to set the control counterclockwise from the "MIN" position. In this position, the control functions only as a volume control and does not provide the quieting feature of squelch. It will, however, permit the reception of weak signals which ordinarily might not be heard with the control set clockwise for squelch operation.

To transmit, press the button on the microphone (or handset), wait just a very short instant for the transmitting tubes to heat and then talk. To listen simply release the button. To turn the "Littlefone" off, return the power switch to the "off" position (down).

The operating range will depend upon the geographical and physical characteristics of the operating location as well as the height of the antenna on the unit with which communication is being maintained; the higher the antenna, the greater the range that can be expected. Best reception will usually be obtained over line-of-sight distances. If possible, operate the unit away from trees and foliage as they tend to absorb the signal. When operating at the extreme range or "fringe area", try various locations for best reception. In some instances, moving just a few inches may improve reception.

SERVICE

The Hallicrafters Company maintains an extensive system of authorized factory service centers where any required service can be accomplished promptly and efficiently at a nominal charge. These same service centers can also accomplish the semi-annual frequency measurement required by the F.C.C. The sign shown at the right is displayed by all authorized service centers. Any service work performed on this radio equipment must be under the supervision of an F.C.C. commercial licensed operator holding a 2nd Class Radio Telephone or higher grade of license.



The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

92X1401-C

NOISE SUPPRESSION

Most installations of the "Littlefone" will not require elaborate noise suppression of the motor vehicle. Therefore, before proceeding with the various methods of noise suppression, it is advisable to first determine the need for it. This is accomplished by moving the vehicle to a remote location at the outer limit of the equipments range. The location selected should be as free from man-made interference as possible.

While receiving the distant station, determine the source of interference by noting the noise level with the vehicle at rest and motor off, and comparing it with the vehicle in motion and motor running. If there is no difference in the noise level, noise suppression of the vehicle would be of little use; if, however, the noise generated by the vehicle is heard above the external noise, suppression of the motor vehicle will be required.

The most common types of noise interference in a vehicle are ignition noise, generator "hash", voltage regulator interference, wheel and tire static, and noise caused by loose mechanical connections. The most effective way to suppress noise is to identify and locate each source and to apply a suppression component to each one in turn. Use the information which follows as a guide. Fig. 7 shows a typical battery ignition system and the correct placement of noise suppression components.

IGNITION NOISE

Ignition noise can be identified as a regular clicking or popping noise which varies with the speed of the motor. In most installations, it can be effectively suppressed by applying one or more of the methods listed below.

a. Insert a good grade 10,000-ohm carbon suppressor at the center tower of the distributor and a 5000-ohm carbon suppressor at each spark plug tower on the distributor. Replace existing spark plugs with resistor type spark plugs or fit them with good grade 10,000-ohm carbon suppressors. The motor timing should be readjusted after installing the suppressors.

b. Place a 0.1 mfd. capacitor in the lead from the ignition switch to the ignition coil, mounted as close as possible to the coil, to prevent high frequency energy from getting back into the low voltage wiring of the vehicle. Additional noise suppression may be obtained by shielding the lead from the coil to the switch and grounding the shield at the fire wall.

c. The metal caps terminating the ignition wires at the distributor are simply clamped to the ends of the cables and depend upon uncertain pressure contact with the wire. These caps should be cleaned and then soldered to the wire to prevent sparking at these points. The cable insulation should be closely inspected for breakdown between wires and ground. Use fiber spacers to keep the cables away from ground and if necessary, reroute the cables to minimize coupling with the low voltage wiring.

GENERATOR "HASH"

Generator "hash" is caused by sparking at the commutator and can be identified as a high pitched whine which varies with the speed of the motor. This trouble can usually be remedied by connecting a .005 mfd disc capacitor, alone or in parallel with a 500 mfd electrolytic capacitor, between the generator output terminal and ground. It is important that the polarity and working voltage of the electrolytic capacitor be observed. If the noise persists or is still excessive, a parallel trap, tuned to the receiver frequency, should be inserted in series with the generator output lead.

VOLTAGE REGULATOR INTERFERENCE

Voltage regulator interference is caused by sparking at the regulator points as they operate to reduce the charging rate as the battery approaches full charge. It appears as a distinct but irregular clicking sound which tends to be less steady than that from the ignition system. Regulator interference can usually be remedied by connecting a .002 mfd mica capacitor in series with a 4-ohm carbon resistor between the field terminal of the regulator and ground. Further suppression may be obtained by inserting a 0.1 mfd coaxial capacitor in series with the voltage regulator leads to the battery and the generator armature. All components should be mounted as close to the regulator as possible for effective suppression.

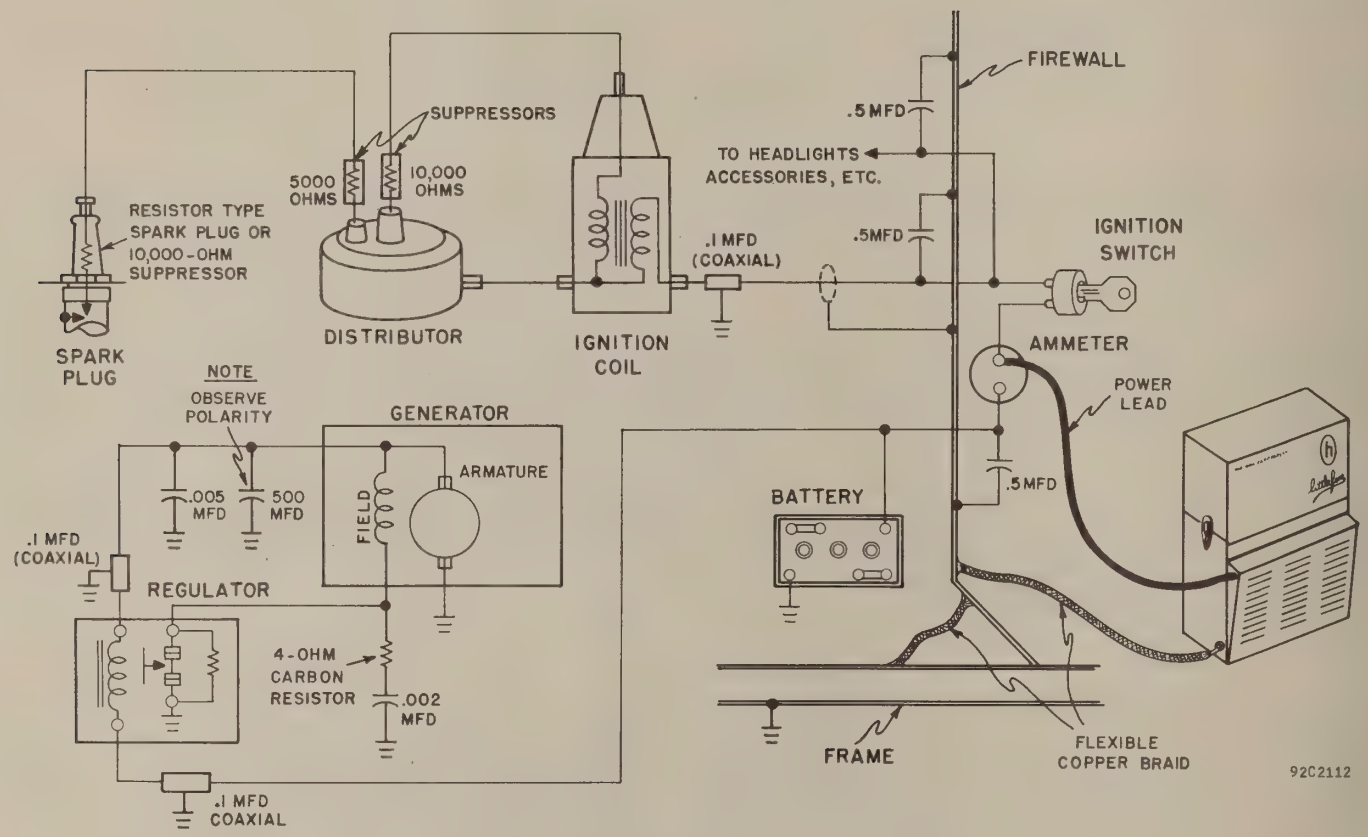


Fig. 7. Typical Ignition System Showing Placement of Noise Suppression Components

WHEEL STATIC

Wheel static is caused by grease in the front wheel bearings insulating the wheels from the chassis of the vehicle. It appears as a steady popping in the receiver at speeds over about 15 mph on smooth roads. Generally, it will not be present on dirt, gravel, or wet roads. Wheel static can be eliminated by installing front wheel static collectors available through most automotive dealers. These collectors will usually require replacement every 10,000 miles.

TIRE STATIC

Tire static causes an erratic popping noise heard only with the car in motion. This noise can usually be eliminated by injecting an anti-static powder into the inner tubes through the valve stems.

MISCELLANEOUS

1. When mounting the noise suppression components, thoroughly clean the contacting surfaces and use external tooth-type lockwashers under all mounting nuts or bolts.

2. The battery leads to the ammeter, gasoline gauge, ignition switch, headlights, taillights, and any accessories should be bypassed to ground with 0.5 mfd metal-case capacitors.

3. The fire wall should be bonded to both the frame of the vehicle and the motor block with flexible copper braid. If the exhaust pipe and muffler are insulated from the frame, ground them to the frame with flexible copper braid.

4. The steering post, as well as any control rods, metal tubes, etc. which pass through the fire wall should be securely bonded to the fire wall with flexible braid.

5. Tighten any loose bolts, especially bumper and fender bolts, and use external tooth-type lockwashers to insure good electrical contact.

CIRCUIT DESCRIPTION

RECEIVER

The receiver is a crystal controlled, double conversion type FM receiver employing thirteen tubes and two crystal diodes. All tubes are of the sub-miniature type and are socket mounted. The tube complement is given in the Service Parts List.

A signal at the operating frequency is received at the antenna and is amplified by the 1st and 2nd RF amplifiers, V-1 and V-2. This amplified signal is applied to the 1st mixer, V-3, where it is mixed with the output of the multiplier, V-12. The multiplier supplies mixer voltage to the 1st mixer at the 16th harmonic of the crystal frequency. The resultant first intermediate frequency is less than the crystal frequency by 1.7 megacycles. This IF signal is amplified by the 1st and 2nd IF amplifiers, V-4 and V-5, and then applied to the grid of the 2nd mixer, V-6. Here it is mixed with the output of crystal oscillator, V-11, obtaining the second intermediate frequency of 1.7 megacycles. This IF signal is amplified by the 3rd IF amplifier, V-7, and the 1st and 2nd limiters, V-8 and V-9. After limiting, the signal is applied to the discriminator where the audio is then recovered.

The audio signal is amplified by the audio amplifier V-10, and fed through the black, single pin plug, PL-3, to the audio output stage, V-101, on the power supply chassis. The signal is also applied to the primary of output transformer T-9. The secondary of T-9 connects to pin 4 of microphone socket SO-2 to supply an audio output of approximately 5 milliwatts for operating the earpiece of a telephone handset which may be used in place of the hand microphone normally supplied.

A squelch circuit is provided to quiet the receiver when no signal is being received. The center-tapped volume/squelch control, R-20, provides squelch action if the arm of the control is set above center tap (clockwise from center); with the arm below center tap (counterclockwise from center), the control functions only as a volume control. The non-squelch portion of the control is provided for fringe area reception where squelch is usually undesirable from the standpoint of signal reduction. V-13, a diode-pentode, is used as a noise amplifier and rectifier. Noise voltage is taken from the grid of the 1st limiter, V-8, amplified, rectified and applied to the grid of the audio amplifier, V-10, biasing it to cut-off. When a signal is received, the limiter grid voltage increases and cuts off the noise amplifier. Thus the cut-off voltage is removed and the audio amplifier operates normally.

The "Littlefone" is normally in a ready-to-receive condition; i.e., the receiver filaments are "on" and the transmitter filaments are "off". When the button on the microphone is depressed, power is applied to the filament changeover relay, RY-1. This relay in turn transfers the filament voltage from the receiver to the transmitter, thus placing the "Littlefone" in a ready-to-transmit condition.

TRANSMITTER

The transmitter is a standard crystal controlled FM transmitter. All tubes are of the sub-miniature type and are socket mounted. The tube complement is given in the Service Parts List. The crystal oscillator, V-14, supplies RF voltage at the crystal frequency to the grids of the modulators, V-15 and V-16. Phase modulation is developed in the grids of these tubes. The output of the modulators is multiplied 48 times through a series of four multipliers, V-17, V-18, V-19 and V-20, and then applied to the buffer-driver, V-21, which drives the final amplifiers, V-22 and V-23. A pi network serves both as the final tank circuit and as the coupling circuit to the quarter wave whip antenna. The microphone supplied is a single button carbon type with press-to-talk button.

POWER SUPPLY AND AUDIO OUTPUT

The audio output stage and power supply are contained on a common chassis located in the lower compartment of the case. The power supply is of the synchronous vibrator type and is designed for operation on both 6 and 12 volt DC supplies. Power changeover is accomplished by replacing the vibrator and changing the positions of the jumpers on terminal strip TS-101.

The rectified AC voltage developed across the high voltage secondary of vibrator transformer T-102 is filtered by a dual section capacitor, C-105, and regulated by means of current regulating lamps, LM-101 and LM-102, to provide the +135 volt plate supply for the transmitter buffer and final amplifiers. Current regulating lamp LM-103 and a type OB2 voltage regulating tube (V-102) provide the regulated +105 volt supply for all tubes in the transmitter and receiver, except the transmitter buffer and final amplifiers.

The low voltage winding of vibrator transformer T-102 feeds a full-wave rectifier circuit employing a dual section selenium rectifier, SR-101. The rectified output is regulated by a series "Amperite" current regulating tube, V-103, and filtered by capacitors C-111 and C-112 to supply the regulated +2 volt filament supply for all tubes in the transmitter and receiver. R-3 and R-49, connected from the filament changeover relay, RY-1, to the receiver and transmitter filament strings respectively, drop the voltage from +2 volts to +1.25 volts for proper filament operation. Current equalizing resistor R-31, connected in parallel with the receiver filament string is used to improve the regulation between the transmit and receive positions.

The audio output signal from the audio amplifier, V-10, on the transmitter-receiver chassis (top chassis) is fed through a single pin plug, PL-3, to the audio input jack, J-101, on the power supply chassis. (See Fig. 9.) The signal is applied to the audio output tube, V-101, which provides the power to drive the built-in speaker LS-101. The secondary of output transformer T-101 provides a 500-ohm output for connecting a remote speaker.

PL-101 and J-102 and a single pin plug and jack for connection to a DC milliammeter when tuning the transmitter. They are located on the power supply chassis. (See Fig. 9.)

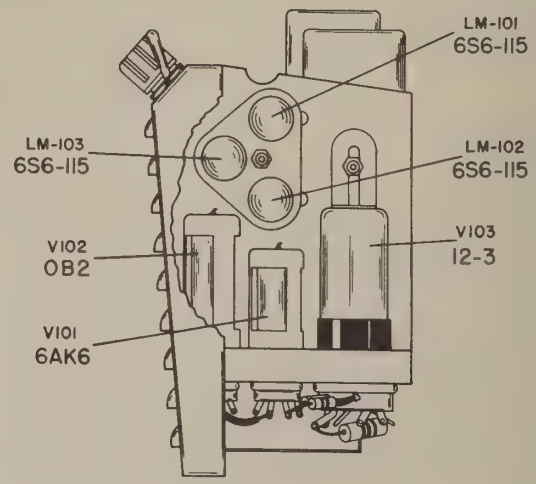


Fig. 8. Side View of Power Supply Chassis Showing Tube Location

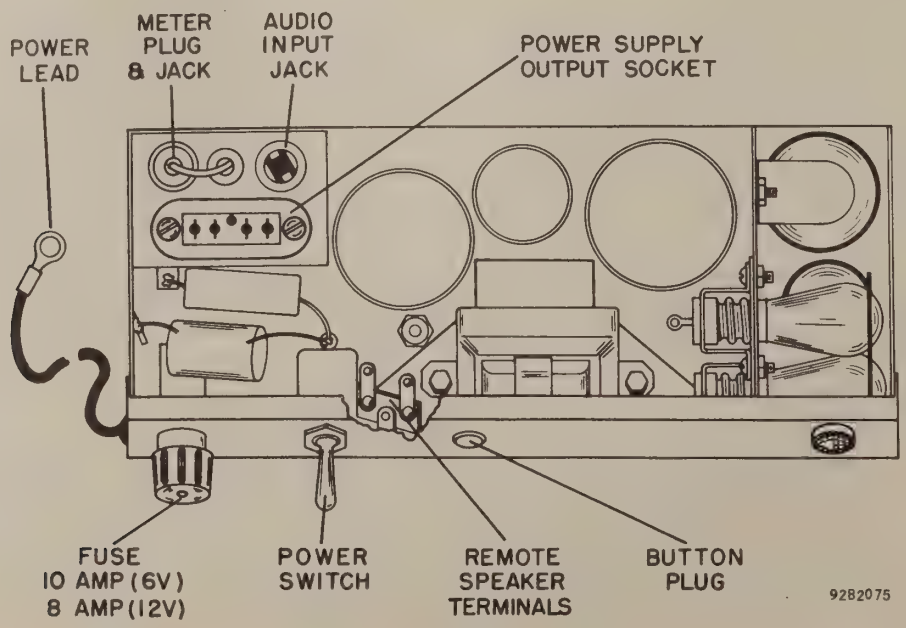


Fig. 9. Top View of Power Supply Chassis

PREVENTIVE MAINTENANCE

A regular preventive maintenance procedure should be followed to prevent unnecessary interruption in the operation of this equipment. This maintenance procedure should include the following:

(1) Make a semi-annual check of the operating frequency as required by the F.C.C. to assure that it is within .005% of the assigned operating frequency.

(2) Take periodic meter readings and, in case of abnormal readings, check tubes.

(3) Periodically check the receiver sensitivity. (Normal sensitivity is approx. -3 volts at P (1st limiter grid resistor) for 1 microvolt at the antenna input.)

(4) If the receiver sounds distorted, check the discriminator setting against a transmitter on the receiver operating frequency. (See Step 8 under Receiver Alignment on page 14.)

(5) Check the antenna loading by observing the combined buffer and final amplifier plate current. This is accomplished by connecting a 50 ma. DC milliammeter between the red, single pin plug and jack on the power supply chassis (see Fig. 9.) Proper operation with rated power output is obtained with a plate current reading of approximately 40 ma.

ALIGNMENT INSTRUCTIONS

EQUIPMENT REQUIRED

1. Laboratory type signal generator covering 6.8 - 8.7 MC and 144 - 174 MC and having excellent frequency stability and accurate microvolt calibrated output attenuator (output attenuation to 0.1 microvolt). Measurements Corp. Model 80 or equivalent.

2. 1.7 MC Crystal controlled oscillator or other stable, accurate 1.7 MC signal source for alignment of receiver IF and discriminator stages. A suitable crystal oscillator circuit which may be readily constructed is shown on page 16.

3. Vacuum tube voltmeter with 0-3 and 0-30 volt DC ranges.

4. DC milliammeter (0-50 ma) with connectors for connecting to red, single pin plug and jack on power supply chassis. (See Fig. 9.)

5. Frequency meter with calibration and measurement accuracy of at least .005% for measuring transmitter output frequency. Lampkin Micrometer Frequency Meter Model 105-B or equivalent.

6. Absorption wavemeters covering 3 to 174 megacycles for checking alignment of multiplier stages in transmitter and receiver. Measurements Corp. "Megacycle Meter" Model 59 or James Millen Mfg. Co. Midget Absorption Frequency Meter Models 90604, 90605, 90606, 90607, 90608, and 90609 (six units required to cover frequency range).

7. RF wattmeter for power output measurements (0-2 watts in frequency range of 144 - 174 megacycles. Bird Electronics Corp. "Termaline" RF Wattmeter Model 61 or equivalent. Wattmeter cable should be equipped with Amphenol Plug 83-1SP to mate with the antenna connector on "Littlefone".

8. 1.0 megohm resistor connected in series with VTVM probe to minimize loading and detuning.

PRELIMINARY ADJUSTMENT

Before starting alignment, measure the transmitter and receiver filament voltages. The filament changeover relay (see Fig. 10) is normally in the "receive" position. To place it in the "transmit" position, merely depress the button on the microphone (or handset). To measure the filament voltages, connect the VTVM to the center terminal on the changeover relay. The filament voltage reading in both the transmit and receive positions should be approximately +2 volts. If the reading in the receive position differs from the transmit position, adjust 29 (tap on current stabilizing resistor, see Fig. 10) until the receiver voltage is equal to the transmitter voltage. When making the adjustment, wait until the reading stabilizes before readjusting.

NOTE: Refer to Figs. 9, 10, and 11 for the location of all alignment adjustments and test points. The adjustment and test points are also shown on the schematic diagram.

CRYSTAL TYPES

To facilitate crystal procurement during production, units were supplied with either JAN type CR-18/U or James Knight type H-17 crystals. (The crystal type is marked on the crystal case.) Replacement should be made with the same type crystal if possible, since circuit modifications and realignment of the associated oscillator circuit are required when replacement is made with a crystal type different from the one in the unit. The circuit modifications required when replacing the H-17 crystal with the more readily available CR-18/U crystal are listed below.

TO REPLACE THE H-17 CRYSTAL WITH THE CR-18/U CRYSTAL

Receiver Crystal

1. Add C-43, a 5-25 mmf trimmer (Part No. 44B430) across the receiver crystal socket.

Transmitter Crystal

1. Add C-67, a 5-25 mmf trimmer (Part No. 44B430) across the transmitter crystal socket.
2. Change the value of R-35, grid resistor for V-14, from 100,000 ohms to 33,000 ohms (Part No. 23X20X333K).
3. Change the value of R-36, screen dropping resistor for V-14, from 100,000 ohms to 22,000 ohms (Part No. 23X20X223K).

TRANSMITTER ALIGNMENT

Before proceeding with the transmitter alignment, remove the plate voltage from the buffer and final amplifier stages by disconnecting the red, single pin plug on the power supply chassis (see Fig. 9). Then connect a short circuiting jumper between terminals 1 and 2 of the microphone socket to place the filament changeover relay in the energized or "transmit" position.

1. On units with JAN type CR-18/U crystal:
   Set 30 (crystal trimmer) in the middle of its tuning range as shown in Fig. 11. Connect the VTVM to T (oscillator grid) and adjust 1 (oscillator plate) for max. neg. voltage at the oscillator grid. Back out 1 (oscillator plate) until the oscillator grid voltage drops to -5.5 volts. This sets the proper "drive" for the transmitter oscillator.

   The transmitter oscillator is operating properly when the VTVM reading at A or B (grid of either modulator) is between -2.5 and -3 volts. Because of differences in crystal activity, it may be necessary to slightly readjust 1 (oscillator plate) until the proper modulator grid voltage is obtained.

   On units with James Knight type H-17 crystal:
   Connect the VTVM to A or B (grid of either modulator) and adjust 1 (oscillator plate) for max. neg. voltage at the crystal frequency (marked on top of crystal). Approx. -3 volts.

2. Connect the VTVM to C (quadrupler grid) and adjust 2 (modulator plate) for max. neg. volts. Approx. -15 volts.
3. Connect the VTVM to D (tripler grid) and adjust 3 (quadrupler plate) for max. neg. volts. Approx. -5 volts. Then touch up 2 (modulator plate).
4. Connect the VTVM to E (1st doubler grid) and adjust 4 (tripler plate) for max. neg. volts. Approx. -8 volts. Then touch up 3 (quadrupler plate).
5. Connect the VTVM to F (2nd doubler grid) and adjust 5 (1st doubler plate) for max. neg. volts. Approx. -7 volts. Then touch up 4 (tripler plate).
6. Connect the VTVM to G (buffer grid resistor) and adjust 6 (2nd doubler plate) for max. neg. volts. Approx. -7 to -10 volts. Then touch up 5 (1st doubler plate).
7. Remove the plate voltage from the final amplifiers by disconnecting wire jumper H (see Fig. 11). Then apply plate voltage to the buffer stage by connecting the milliammeter between the red, single pin plug and jack on the power supply chassis.
8. Adjust 7 (buffer plate) for dip in buffer plate current as indicated on milliammeter.
9. The buffer stage has been neutralized at the factory and should normally not require readjustment. To determine if adjustment is necessary, first remove the plate voltage from the buffer stage by disconnecting the milliammeter. Then connect the VTVM to J (final grid resistor). If the stage is properly neutralized, an indication of approximately -.2 volt or less will be obtained on the VTVM. If neutralization is required, follow the procedure outlined under BUFFER NEUTRALIZATION on page 13.

10. The final amplifier stage has also been neutralized at the factory and should normally not require readjustment. A check may be made to determine if adjustment is necessary as follows:

    (a) Set 9 (output loading capacitor) for maximum capacity as shown in Fig. 11.

    (b) Connect the VTVM to J (final grid resistor).

    (c) Apply plate voltage to the buffer stage by reconnecting the milliammeter. Retune 7 (buffer plate) for dip in plate current.

    (d) Tune 10 (output tuning capacitor) through resonance. If the final amplifier stage is not neutralized, a corresponding dip in grid voltage will be noted as 10 is tuned through resonance; if properly neutralized, no change in grid voltage will be noted. If neutralization is necessary, follow the procedure outlined under FINAL AMPLIFIER NEUTRALIZATION below.

11. Set 9 (output loading capacitor) for maximum capacity as shown in Fig. 11. Apply plate voltage to the final amplifiers by connecting wire jumper H.

12. Connect the VTVM to J (final grid resistor). Tune 10 (output tuning capacitor) for minimum plate current (approx. 30 ma). Slightly retune 7 (buffer plate) for maximum grid voltage as indicated on the VTVM. Repeat the procedure several times, tuning 10 for minimum plate current and 7 for maximum grid voltage. Correct adjustment of the final amplifiers is indicated by a VTVM reading of approx. -30 volts.

13. Connect the antenna.

14. Adjust 10 (output tuning capacitor) for resonance as indicated by minimum plate current. Then decrease the value of 9 (output loading capacitor) in small steps, each time retuning 10 for minimum plate current. Proper operation with rated power output is obtained with a plate current reading of approx. 40 ma.

15. The power output of the transmitter may be measured by connecting the RF wattmeter to the antenna input connector and adjusting 9 (output loading capacitor) and 10 (output tuning capacitor) as indicated in Step 14. Normal power output is 1.0 watt.

16. Align the receiver if required.

17. On units with JAN type CR-18/U crystal:
    Set the transmitter on frequency by adjusting 30 (crystal trimmer). Recheck the "drive" as outlined in Step 1 and then recheck the operating frequency. If necessary, touch up all tuning adjustments except the oscillator adjustments.

    On units with James Knight type H-17 crystal:
    Set the transmitter on frequency by adjusting 1 (oscillator plate). If necessary, touch up all tuning adjustments except the oscillator adjustment.

    NOTE: The operating frequency must be within .005% of the assigned operating frequency to comply with F.C.C. regulations.

18. Place the chassis in the case and then install the complete unit in the vehicle. Connect the antenna and repeat Step 14. To gain access to the output tuning adjustments, 9 and 10, remove the button plugs from the right side of the case.

BUFFER NEUTRALIZATION

1. Before neutralizing the buffer, follow the instructions given in Step 9 on page 12.

2. To neutralize the buffer stage, adjust 8 (buffer neutralizing coil) for a minimum reading on the VTVM. Then retune 7 (buffer plate) and 6 (2nd doubler plate) to provide a maximum reading on the VTVM. Repeat the procedure until a VTVM indication of approximately -.2 volt or less is obtained.

3. Apply plate voltage to the buffer stage by reconnecting the milliammeter. Connect the VTVM to G (buffer grid resistor) and touch up 8 to maximize buffer grid voltage.

FINAL AMPLIFIER NEUTRALIZATION

1. Before neutralizing the final amplifiers, follow the instructions given in Step 10 above.

2. To neutralize the final, make small adjustments of 11 (final neutralizing coil) for minimum reaction in grid voltage as 10 (output tuning capacitor) is tuned through resonance. With each small adjustment of 11, retune 7 (buffer plate) to maximize the VTVM indication. When neutralization is complete, tuning 10 through resonance will not have any appreciable effect upon the VTVM indication.

RECEIVER ALIGNMENT

1. On units with JAN type CR-18/U crystal:
   Set 31 (crystal trimmer) in middle of its tuning range as shown in Fig. 11. Connect the VTVM to K (oscillator grid) and adjust 12 (oscillator screen) for max. neg. voltage at the oscillator grid (approximately -17.5 volts). Back out 12 (oscillator screen) until the oscillator grid voltage drops to approximately -14 volts.

   The receiver oscillator is operating properly when the VTVM reading at N (2nd mixer grid resistor) is between -3 to -4 volts. Because of differences in crystal activity, it may be necessary to slightly readjust 12 (oscillator screen) until the proper reading at N is obtained.

   On units with James Knight type H-17 crystal:
   Connect the VTVM to K (oscillator grid) and adjust 12 (oscillator screen) for max. neg. voltage. Approx. -25 volts.

   It should be noted that the magnitude of the bias voltage developed at the 1st and 2nd mixers by the oscillator injection signal will depend to a large extent upon how 27 (2nd RF plate) and 21 and 22 (2nd IF plate) are tuned. When the entire receiver is properly aligned, these voltages will be different (usually lower) than the values indicated in the alignment instructions.

2. Connect the VTVM to L (multiplier grid) and adjust 13 (oscillator plate) to the 4th harmonic of the crystal. Approx. -10 volts.

3. Connect the VTVM to M (1st mixer grid) and adjust 14 (multiplier plate) to the 16th harmonic of the crystal. Then touch up 13 (oscillator plate). Approx. -1 volt.

4. Connect the 1.7 MC signal source to N (2nd mixer grid resistor).

   a. Connect the VTVM to P (1st limiter grid resistor). Adjust 15 and 16 (2nd mixer plate) and 17 and 18 (3rd IF plate) for maximum indication. Approx. -12 volts for 1 volt input.

   b. Connect the VTVM to R (disc. input) and adjust 19 (disc. primary) for maximum indication. Approx. -10 volts.

   c. Connect the VTVM to S (disc. output)and adjust 20 (disc. secondary) for zero reading on the VTVM. The correct zero point is between a positive and negative maximum.

5. Set the signal generator at the 1st IF frequency (1st IF = Crystal Freq. - 1.7 MC) and connect it to N. Connect the VTVM to S (disc. output). Carefully adjust the signal generator frequency for a zero reading on the VTVM.

6. Disconnect the generator and connect it to M (1st mixer grid). Disconnect the VTVM and connect it to P (1st limiter grid resistor). Adjust 21 and 22 (2nd IF plate), 23 and 24 (1st IF plate) and 25 and 26 (1st mixer plate) for maximum indication. Approx. -1 volt for 25 microvolt input.

7. Set the signal generator at the operating frequency and connect it to the antenna input. Connect the VTVM to P (1st limiter grid resistor). Adjust 27 (2nd RF plate), 28 (1st RF plate), 14 (multiplier plate) and 13 (oscillator plate) for maximum indication. Approx. -3 volts for 1 microvolt input.

8. Attach the antenna and check the discriminator setting against a transmitter on the receiver operating frequency. The VTVM indication at S (disc. output) should be zero volts, plus or minus .1 volt. If not, readjust 20 (disc. sec.) until a zero reading is obtained. Then connect the VTVM to P (1st limiter grid resistor) and touch up 14 (multiplier plate) for maximum indication.

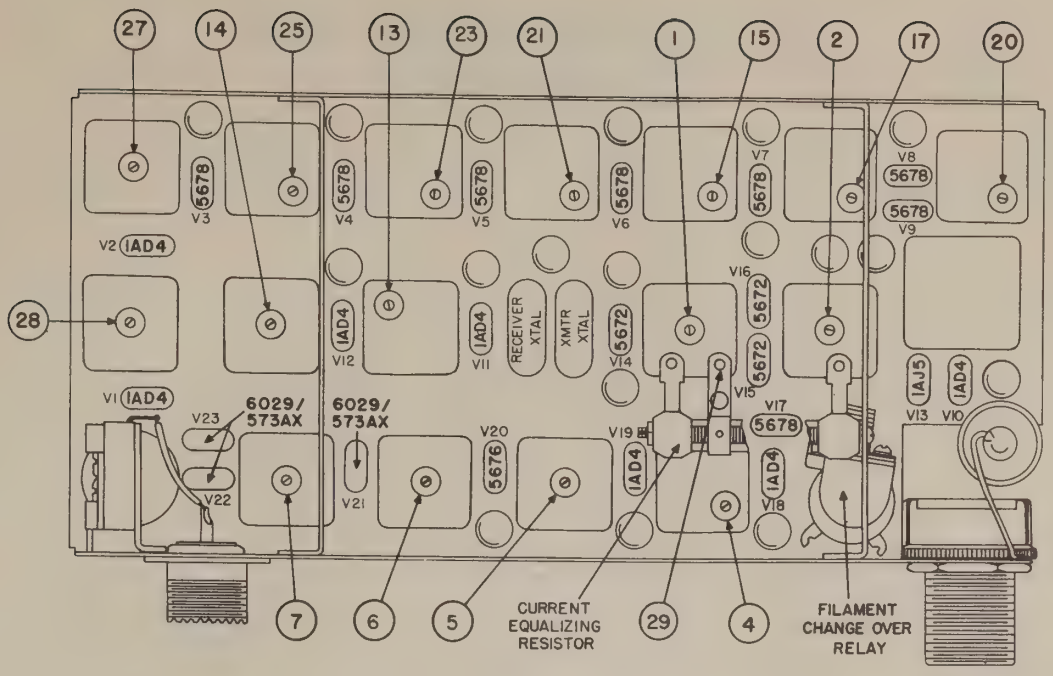
9. If lower than normal sensitivity is noted, the receiver crystal may be operating at a frequency just slightly different from that indicated on the holder. To remedy such a condition, follow the procedure outlined below.

   a. Set the signal generator on the receiver operating frequency with the frequency meter. An alternate method is to use a tunable receiver such as the Hallicrafters S-81, zero beating the signal generator with a transmitter on the receiver operating frequency.

   b. Connect the signal generator to the antenna input and the VTVM to R (disc. input).

   c. On units with JAN type CR-18/U crystal:
      Touch up 31 (crystal trimmer), 13 (oscillator plate), and 14 (multiplier plate) for max. neg. voltage, keeping the generator output as low as possible.

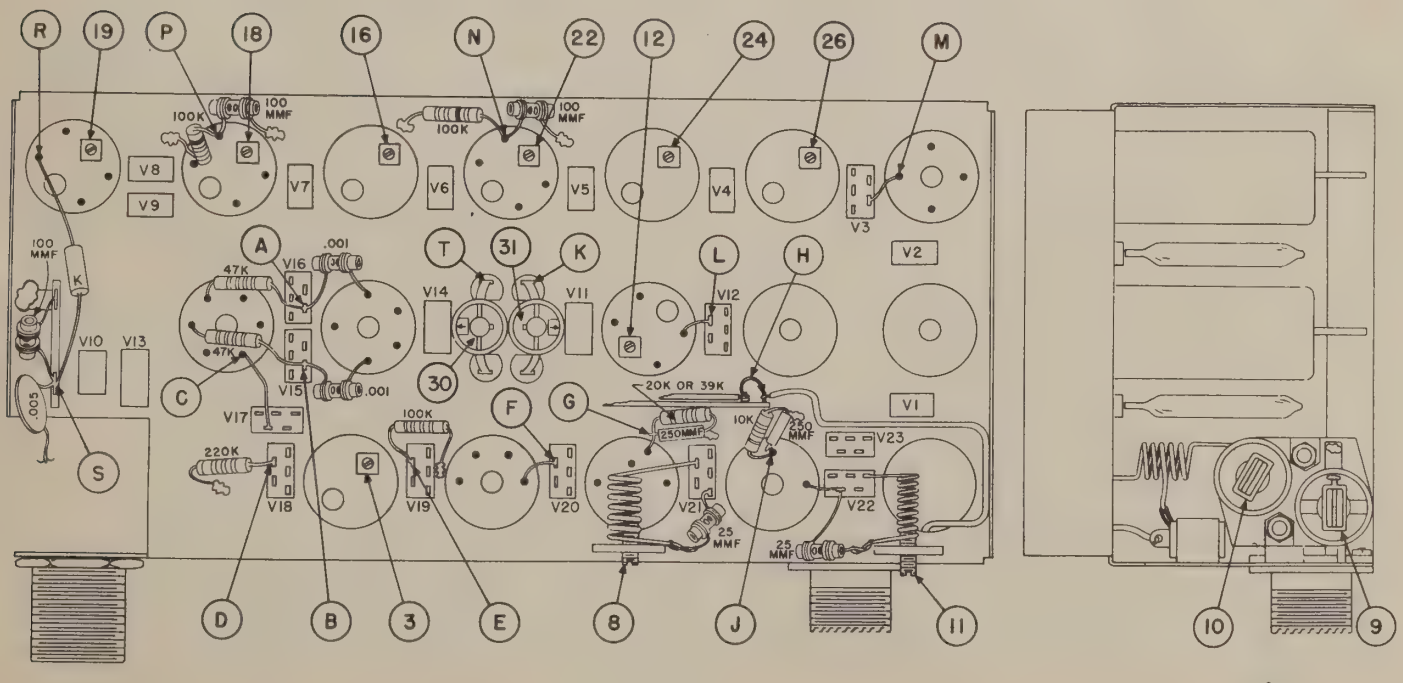
      On units with James Knight type H-17 crystal:
      Touch up all IF adjustments including the disc. primary for max. neg. voltage. Keep the generator output as low as possible.



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NOTE: ON SOME SETS, TYPE 2E32 TUBES WERE SUBSTITUTED FOR TYPE 5678 FOR V-4, V-5, AND V-7. WHEN MAKING REPLACEMENT ON THESE SETS, EITHER TUBE TYPE MAY BE USED. IF POSSIBLE USE THE SAME TUBE TYPE FOUND IN THE SET. WHEN REPLACING TYPE 2E32 WITH TYPE 5678, IT MAY BE NECESSARY TO SLIGHTLY LOOSEN THE COUPLING OF THE GIMMICK CAPACITOR IN THE PLATE CIRCUIT OF THE TUBE BEING REPLACED TO PREVENT OSCILLATION CAUSED BY THE SLIGHTLY HIGHER GAIN OF TYPE 5678. DO NOT USE TYPE 2E32 TO REPLACE TYPE 5678.

Fig. 10. Top View of Transmitter-Receiver Chassis Showing Location of Alignment Adjustments and Tubes

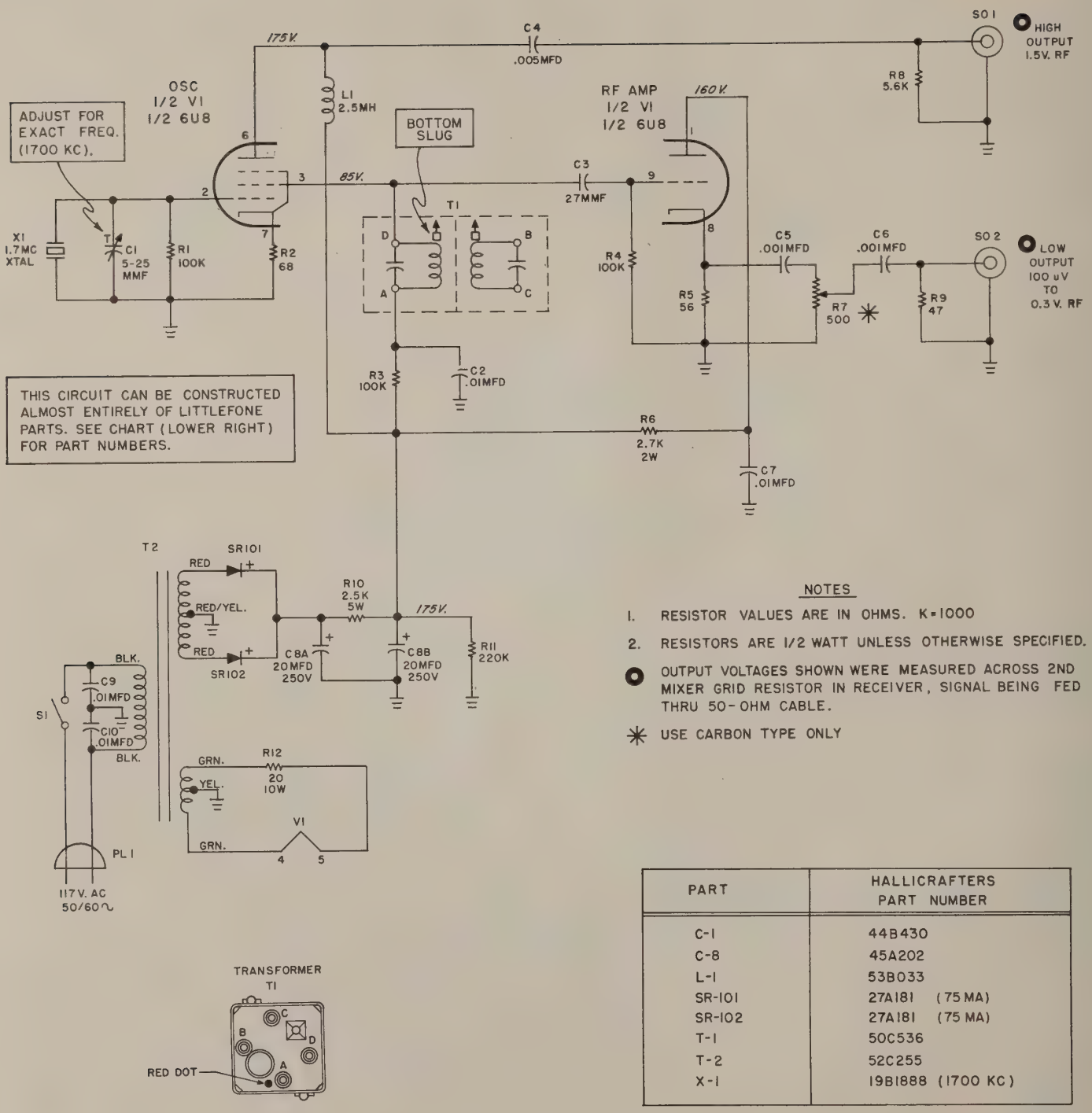


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Fig. 11. Bottom and Side Views of Transmitter-Receiver Chassis Showing Location of Alignment Adjustments and Test Points

1.7 MC CRYSTAL OSCILLATOR

(Used for alignment of receiver IF and discriminator stages)



NOTES

1. RESISTOR VALUES ARE IN OHMS. K=1000
2. RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.

⊙ OUTPUT VOLTAGES SHOWN WERE MEASURED ACROSS 2ND MIXER GRID RESISTOR IN RECEIVER, SIGNAL BEING FED THRU 50-OHM CABLE.

✳ USE CARBON TYPE ONLY

PART	HALLICRAFTERS PART NUMBER
C-1	44B430
C-8	45A202
L-1	53B033
SR-101	27A181 (75 MA)
SR-102	27A181 (75 MA)
T-1	50C536
T-2	52C255
X-1	19B1888 (1700 KC)

92D 2024

MODEL HT-26

SPECIFICATIONS

TYPE: Mobile FM Transmitter-Receiver

FREQUENCY RANGE: 144 to 174 MC

TRANSMITTER:

1. Power Output	1.0 watt
2. Frequency Stability	0.005% from -20° to + 70° Centigrade. Crystal controlled. Crystal frequency multiplied 48 times.
3. Modulation	Phase. ± 15 KC deviation (no modulation limiter).
4. Antenna	Quarter wave flexible whip for roof-top mtg. 52 ohm impedance.
5. Spurious Radiation	60 db down.
6. Pre-emphasis	Standard 6 db per octave.
7. Distortion	9% with 100% modulation at 1000 cps.
8. Power Requirements	Filament: 1.25 volts at 1.36 amps. Plate: 135 volts at 34 ma.; 105 volts at 23 ma.
9. Power Input to Final	135 volts at 22 ma.
10. Duty Cycle	1 minute on, 1 minute off.
11. Microphone	Single button carbon microphone with press-to-talk button.
12. Tubes	10

RECEIVER:

1. Sensitivity	1 microvolt or better for 20 db signal to noise ratio.
2. Selectivity	60 db at 45 KC. 95 db at 60 KC.
3. Frequency Stability	0.005% from -20° to + 70° Centigrade.
4. Receiver Type	Superheterodyne. Double conversion crystal controlled local oscillator.
5. Spurious Response	All more than 75 db down.
6. Audio Output (for earpiece of telephone handset)	5 milliwatts with 15% distortion. 3 milliwatts with 5% distortion.
7. Receiver De-emphasis	Standard 6 db per octave.
8. Antenna	Same as for transmitter.
9. Squelch	0.5 microvolt to open.
10. Power Requirements	Filament - 1.25 volts at 1.36 amp. Plate - 105 volts at 21 ma.
11. Tubes and Rectifiers	13 tubes and 2 germanium crystal diodes

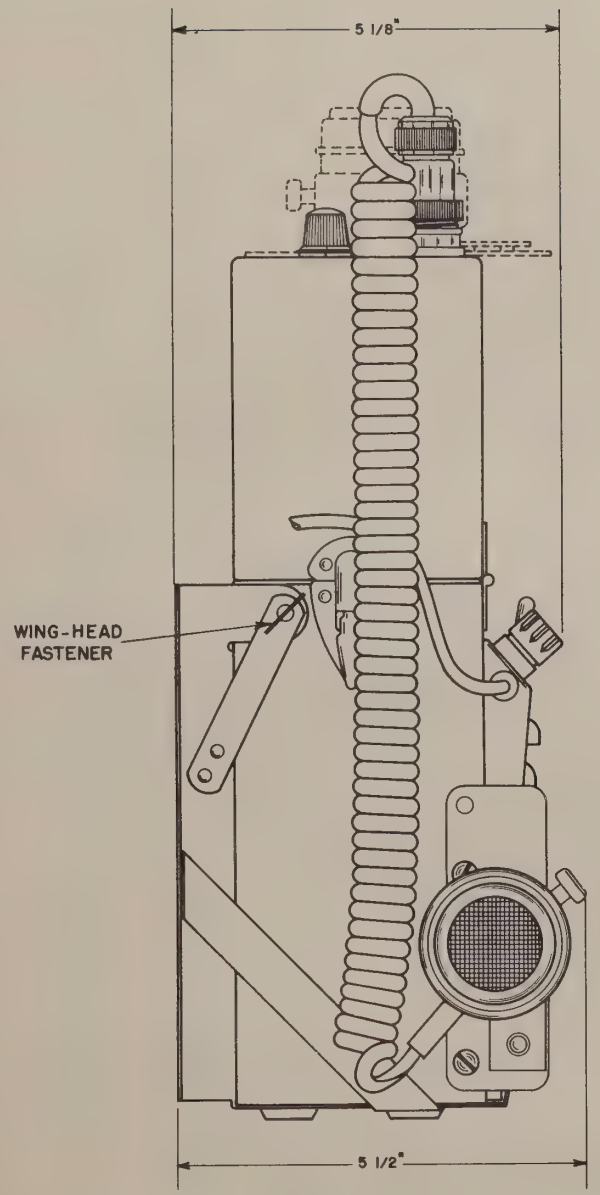
POWER SUPPLY & AUDIO OUTPUT

1. Power Input	6.3 or 12.6 volts DC (Power changeover accomplished as outlined on page 4).
2. Current Drain	

	at 6.3V	at 12.6V
Receive -	5.5 amps	2.9 amps
Transmit -	6.7 amps	3.8 amps

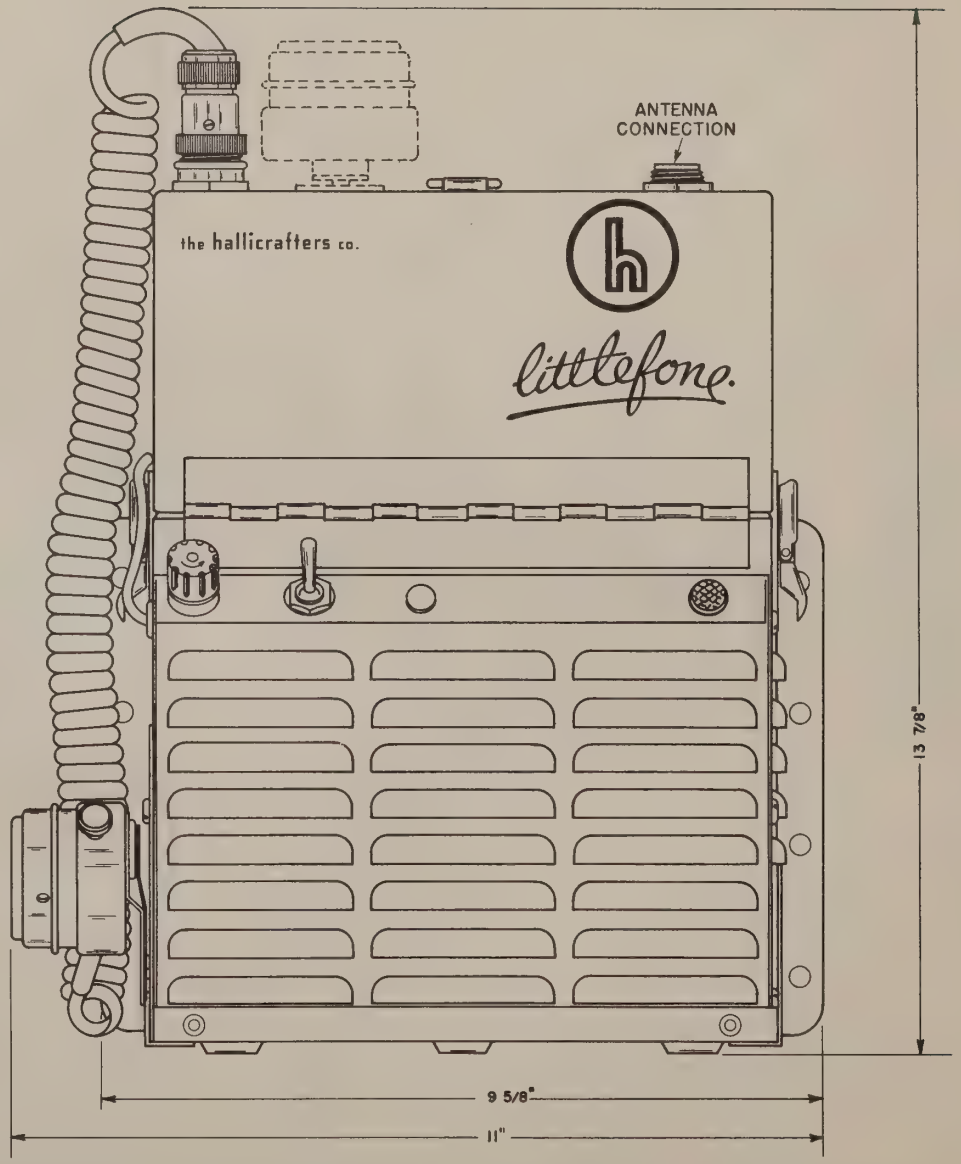
3. Output Voltages	Regulated + 135 volts at 34 ma. Regulated + 105 volts at 22 ma. Regulated + 2 volts at 1.36 amps.
4. Audio Input Impedance	High Impedance
5. Built-in Speaker	4-inch PM; 3.2-ohm voice coil
6. Audio Output Impedance	500 ohms (for remote speaker)
7. Audio Output (built-in speaker)	1.0 watt
8. Tubes and Rectifiers	1 tube plus voltage regulator, current regulator and selenium rectifier.

WEIGHT: 14-3/4 lbs. with unit, mtg. bracket, and microphone.



NOTE
WHEN UNIT IS MOUNTED HORIZONTALLY, MICROPHONE AND HOLDER MOUNT ON TOP LEFT OF CASE AS INDICATED BY THE DOTTED LINES.

Fig. 12. Front View of Unit (In Mtg. Bracket) Showing Dimensions



92D2078

Fig. 13. Side View of Unit (In Mtg. Bracket) Showing Dimensions

SERVICE PARTS LIST

Replacement parts may be obtained through Hallicrafters territorial and local distributors, or through Hallicrafters Service Divison, 823 S. Tripp Avenue; Chicago 24, Illinois. When ordering parts, specify Hallicrafters Part Number and Description.

UPPER COMPARTMENT PARTS

(TRANSMITTER-RECEIVER CHASSIS)

Schematic Symbol	Description	Hallicrafters Part Number	Cross Reference
	CAPACITORS		
C-1,29,54,59,63	25 mmf. 500 V., ceramic	47A285	174-0010-00
C-2,3,4,5,20,57,58, 61,62,64,65	250 mmf. 500 V., mica; toothpick type	47A279	172-5000-00
C-6,9,11,13,15,16, 25,31,33,38	.02 mfd. 400 V., tubular	47A277	173-5003-00
C-7,8,10,12	.1 mmf. wire gimmick	---------	----------
C-14,18,28,36	100 mmf. 500 V., ceramic	47X30UK101K	174-0017-00
C-17,35	1 mmf. 500 V., gimmick	47A160-2	174-0001-00
C-19,46	2.2 mmf. 500 V., gimmick	47A160-4	174-0002-00
C-21	500 mmf. 500 V., ceramic	47A278	174-0018-00
C-22,23,40,42	.01 mfd. 450 V., ceramic disc	47A217	174-0021-00
C-24,47,50	1000 mmf. 500 V., ceramic	47A280	174-0019-00
C-26,34,37,45,52,53, 55,56	.002 mfd. 400 V., tubular	47A276	173-5000-00
C-27,41,48,49	.005 mfd. 450 V., ceramic disc	47A168	174-0020-00
C-30	10 mmf. 500 V., ceramic	47X20CK100F	174-0005-00
C-32	5 mmf. 500 V., ceramic	47A289	174-0022-00
C-43,67	5-25 mmf. trimmer	44B430	----------
C-51	250 mfd. 6 V., electrolytic	45A201	170-0003-00
C-60	50 mmf. 500 V., ceramic	47A284	174-0012-00
C-66A & B	Capacitor, variable; 7-45 mmf. each section	44A413	171-0007-00
C-68	1.5 mmf. 500V., ceramic	47X20CH1R5C/D	----------
C-69,80,82,83,84, 85,86,87	1.0 mmf. 500V., ceramic	47X20CH010C/D	----------
C-70	2.0 mmf. 500V., ceramic	47X20CH020C/D	----------
C-81	3.0 mmf. 500V., ceramic	47X20CH030C/D	----------
	RESISTORS		
R-1	2 megohms 1/2 watt, carbon	23X20X205K	160-0167-00
R-2,4,13,37,38,41,43	47,000 ohms 1/2 watt, carbon	23X20X473K	160-0128-00
R-3	.868 ohms; #26 nichrome wire (4-9/32")	87A2431	P-4690-1
R-5,14,16,17,18	560,000 ohms 1/2 watt, carbon	23X20X564K	160-0154-00
R-6,7,28	33,000 ohms 1/2 watt, carbon	23X20X333K	----------
R-8,10,23,24,25,27,44	100,000 ohms 1/2 watt, carbon	23X20X104K	160-0136-00
R-9,15,40	150,000 ohms 1/2 watt, carbon	23X20X154K	160-0140-00
R-11,12	1 megohm 1/2 watt, carbon	23X20X105K	160-0160-00
R-19	270,000 ohms 1/2 watt, carbon	23X20X274K	----------
R-20	Volume/squelch control; 1 megohm, center tapped	25B1032	----------
R-21,22,26,33,42	220,000 ohms 1/2 watt, carbon	23X20X224K	160-0145-00
R-31	5 ohms 10 watts, adjustable wirewound	24A964	----------
R-32	1200 ohms 1/2 watt, carbon	23X20X122K	----------
R-35	100,000 ohms 1/2 watt, carbon (on units with James Knight type H-17 crystal)	23X20X104K	160-0136-00
R-35	33,000 ohms 1/2 watt, carbon (on units with JAN type CR-18/U crystal)	23X20X333K	----------
R-36	100,000 ohms 1/2 watt, carbon (on units with James Knight type H-17 crystal)	23X20X104K	160-0136-00
R-36	22,000 ohms 1/2 watt, carbon (on units with JAN type CR-18/U crystal)	23X20X223K	----------
R-39	27 ohms 1/2 watt, carbon	23X20X270K	160-0001-00
R-45,47	470 ohms 1/2 watt, carbon	23X20X471K	----------
R-46	39,000 ohms 1/2 watt, carbon	23X20X393K	160-0126-00
R-48	10,000 ohms 1/2 watt, carbon	23X20X103K	160-0112-00
R-49	.56 ohms; #26 nichrome wire (2-15/16")	87A2432	P-4690-2
	COILS AND TRANSFORMERS		
L-1,3	Choke, RF	53A256	P-4686-5
L-2	Coil, buffer neutralizing	51A1517	P-4688
L-4	Choke, RF	53-257	P-4447
L-5	Coil, final neutralizing	51A1518	P-4689
L-6	Coil, final plate	51A1516	P-4686-1
T-1	Transformer, 1st RF	50C533	P-4380
T-2	Transformer, 2nd RF	50C534	P-4381

UPPER COMPARTMENT PARTS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number	Cross Reference
	COILS AND TRANSFORMERS (Cont.)		
T-3,4,5	Transformer, 1st mixer, 1st IF, and 2nd IF	50C535	P-4374
T-6,7	Transformer, 2nd mixer and 3rd IF	50C536	P-4382
T-8	Transformer, discriminator	50C537	P-4383
T-9	Transformer, modulation and audio output	55C211	----------
T-10	Transformer, oscillator; receiver	50C538	P-4384
T-11	Transformer, multiplier; receiver	50C539	P-4385
T-12	Transformer, oscillator; transmitter	50C540	P-4401
T-13	Transformer, modulator plate	50C541	P-4402
T-14	Transformer, quadrupler and tripler	50C542	P-4682
T-15	Transformer, 1st doubler	50C543	P-4683
T-16	Transformer, 2nd doubler	50C544	P-4684
T-17	Transformer, buffer	50C545	P-4685
	PLUGS AND SOCKETS		
PL-1	Plug and cable assembly, power supply	87B3679	----------
PL-2	Plug, microphone (part of microphone MI-1)	----------	----------
PL-3	Plug, audio output; single pin (black)	35A027	----------
SO-2	Socket, microphone	10A491	145-0003-00
SO-3	Socket, antenna	10A490	P-4261
	Socket, crystal	6A417	141-0012-00
	Socket, tube; 6 pin	6A418	141-0006-00
	Socket, tube; 5 pin	6A419	141-0004-00
	TUBE COMPLEMENT		
V-1,2,10,11,12, 18,19	1AD4: 1st RF amplifier, 2nd RF amplifier, audio amplifier, oscillator (receiver), multiplier, tripler, and 1st doubler	90X1AD4	140-0002-00
V-3,4,5,6,7,8,9,17	CK5678: 1st mixer, 1st IF amplifier, 2nd IF amplifier, 2nd mixer, 3rd IF amplifier, 1st limiter, 2nd limiter, and quadrupler	90XCK5678	140-0015-00
V-13	1AJ5 (1AG5/2E41): squelch	90X1AJ5	----------
V-14,15,16	CK5672: oscillator (transmitter), modulators	90XCK5672	140-0013-00
V-20	CK5676: 2nd doubler	90XCK5676	----------
V-21,22,23	6029/573AX: buffer, final amplifiers	90X3029/573AX	140-0012-00
	MISCELLANEOUS PARTS		
	Antenna assembly (complete with cable, connector and mtg. hdwe.)	57-198	----------
	Button plug	17A123	123-0006-00
GR-1,2	Crystal diode, germanium	19A1879	149-0005-00
*X-1	Crystal, receiver; JAN type CR-18/U (specify frequency)	19B1887	----------
*X-1	Crystal, receiver; James Knight type H-17 (specify frequency)	19B1880	Knight Type H-17
*X-2	Crystal, transmitter; JAN type CR-18/U (specify frequency)	19B1888	----------
*X-2	Crystal, transmitter; James Knight type H-17 (specify frequency)	19B1881	Knight Type H-17
	Dial plate, Volume/Squelch control	13B1109	----------
	Gasket, rubber; 5/16" id, 9/16" od.	12A067	P-4260-1
	Gasket, rubber; 47/64" id, 1-1/8" od	12A068	P-4260-2
	Gasket, rubber; 39/64" id, 51/64" od	12A069	P-4260-4
	Knob, Volume/Squelch control	15A502	126-0001-00
	Latch, case (upper section)	30A248	P-4276-1
MI-1	Microphone (includes cord and plug)	81B090	----------
	Operating and Service Instruction Book	94X1163	----------
	Pin, hinge	74A554	P-4702-3
RY-1	Relay	21B139	150-0001-00
	Ring, retaining; for mtg. 6 pin tube sockets	76A917	130-0004-00
	Ring, retaining; for mtg. 5 pin tube sockets	76A918	130-0003-00
	Top compartment of case	66C824	P-4758

* See crystal type and frequency marked on crystal.

LOWER COMPARTMENT PARTS
(POWER SUPPLY CHASSIS)

Schematic Symbol	Description	Hallicrafters Part Number	Cross Reference
	CAPACITORS		
C-101	.005 mfd. 450 V., ceramic disc	47A168	174-0020-00
C-102	10 mfd. 25 V., electrolytic	45A121	----------
C-103	.004 mfd. 1600 V., oil filled tubular	46A195	----------
C-104,110	.5 mfd. 100 V., tubular	46A196	173-0005-00
C-105	20-20 mfd. 250 V., electrolytic	45A202	170-0002-00
C-106,107,108,113	.0015 mfd. 500 V., ceramic feed-thru	47B382	----------
C-109	Spark plate (see Miscellaneous Parts for part numbers of mica insulators)	----------	----------
C-111	5000 mfd. 10 V., electrolytic	45B205	P-4788
C-112	250 mfd. 6 V., electrolytic	45A201	----------
	RESISTORS		
R-101	470,000 ohms 10%, 1/2 watt; carbon	23X20X474K	----------
R-102	390 ohms 10%, 1/2 watt; carbon	23X20X391K	----------
R-103	10,000 ohms 10%, 1 watt; carbon	23X30X103K	----------
R-104	39 ohms 10%, 2 watt; carbon	23X40X390K	----------
R-105	100,000 ohms 10%, 1/2 watt; carbon	23X20X104K	160-0136-00
	COILS AND TRANSFORMERS		
L-101	Choke, RF; 2.9 uh, 12 amps	53A261	----------
T-101	Transformer, audio output (part of speaker LS-101)	----------	----------
T-102	Transformer, vibrator	52C254	----------
	PLUGS AND SOCKETS		
J-101	Jack, audio input; black	6A479	----------
J-102	Jack, meter; red	6A424	141-0001-00
PL-101	Plug, meter; red	35A023	144-0001-00
	Socket, lamp	86A148	----------
SO-102	Socket, power supply output; 4 pin	6A426	P-4756-1
	Socket, tube; miniature 7 pin	6A483	----------
	Socket, tube; octal	6B296	----------
SO-101	Socket, vibrator	6A084	----------
	TUBES AND RECTIFIERS		
V-101	6AK6: audio output	90X6AK6	----------
V-102	OB2: voltage regulator	90X0B2	----------
V-103	12-3: current regulator	90X12-3	----------
SR-101	Rectifier, selenium; dual section @ 1.5 amps	27B188	----------
	MISCELLANEOUS PARTS		
	Bottom compartment of case	66C917	----------
	Button plug	17A123	123-0006-00
	Clip, vibrator mtg.	76B1087	----------
	Fastener, spring; female (for locking case in mtg. bkt.)	76B1095	----------
F-101	Fuse, 10 amp 250 V.; type 3AG (for 6 volt operation)	39A380	----------
F-101	Fuse, 8 amp. 250 V.; type 3AG (for 12 volt operation)	39A365	----------
	Grommet, rubber; 3/16" id x 7/16" od	16A012	----------
	Grommet, rubber; 5/32" id x 7/16" od (for power lead)	16A018	----------
	Grommet, rubber: (for remote sprk. lead opening)	16A050	----------
	Holder, fuse	6A451	----------
	Insulator, mica; 2-1/16" x 1-3/4" (part of spark plate C-109)	8A2146	----------
	Insulator, mica; 1-11/16" x 1-11/16" (part of spark plate C-109)	8A2147	----------
	Jewel	86A140	----------
LM-101,102,103	Lamp, type 6S6-115; 6 watt, 115 volt; candelabra base	39A002	----------
	Latch, case (lower section)	30A249	P-4276-2
	Microphone holder	41X23047	----------
LS-101	Speaker, 4-inch PM; includes output transformer T-101	85C149	----------
S-101	Switch, on-off; spst toggle	60A484	138-0001-00
MV-101	Vibrator (6 volt)	27B187	----------
MV-101	Vibrator (12 volt)	27B108	----------

MOUNTING BRACKET PARTS

	Bumper, rubber	16A339	----------
	Mounting bracket	67D1936	----------
	Pin (for wing-head fastener)	74A601	----------
	Retainer, spring	76A1090	----------
	Wing-head fastener (less pin)	73A844	----------

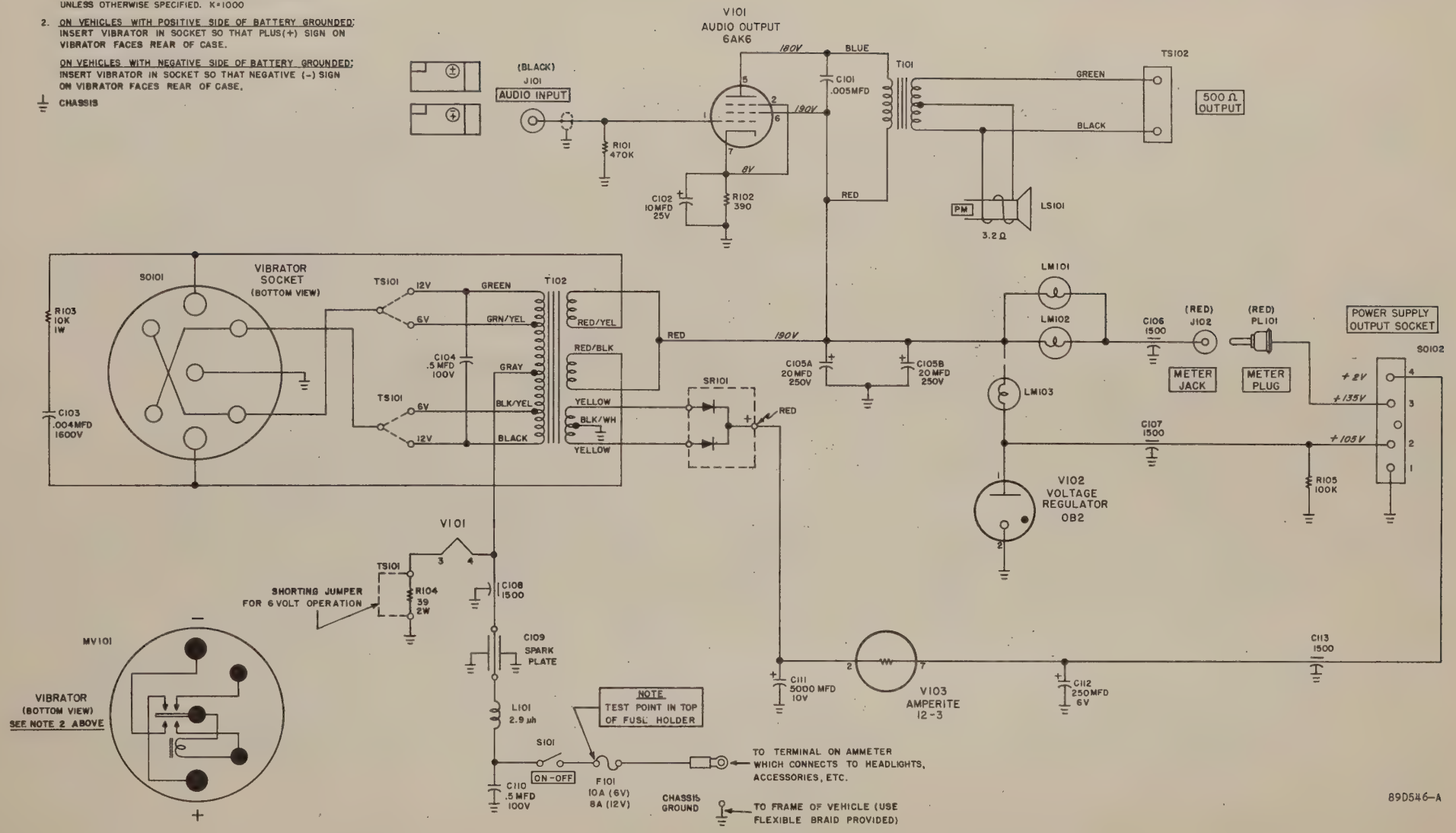
MODEL HT-26
RUN 1
(POWER SUPPLY & AUDIO OUTPUT)

NOTES

1. RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED. K=1000
2. ON VEHICLES WITH POSITIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT PLUS(+) SIGN ON VIBRATOR FACES REAR OF CASE.

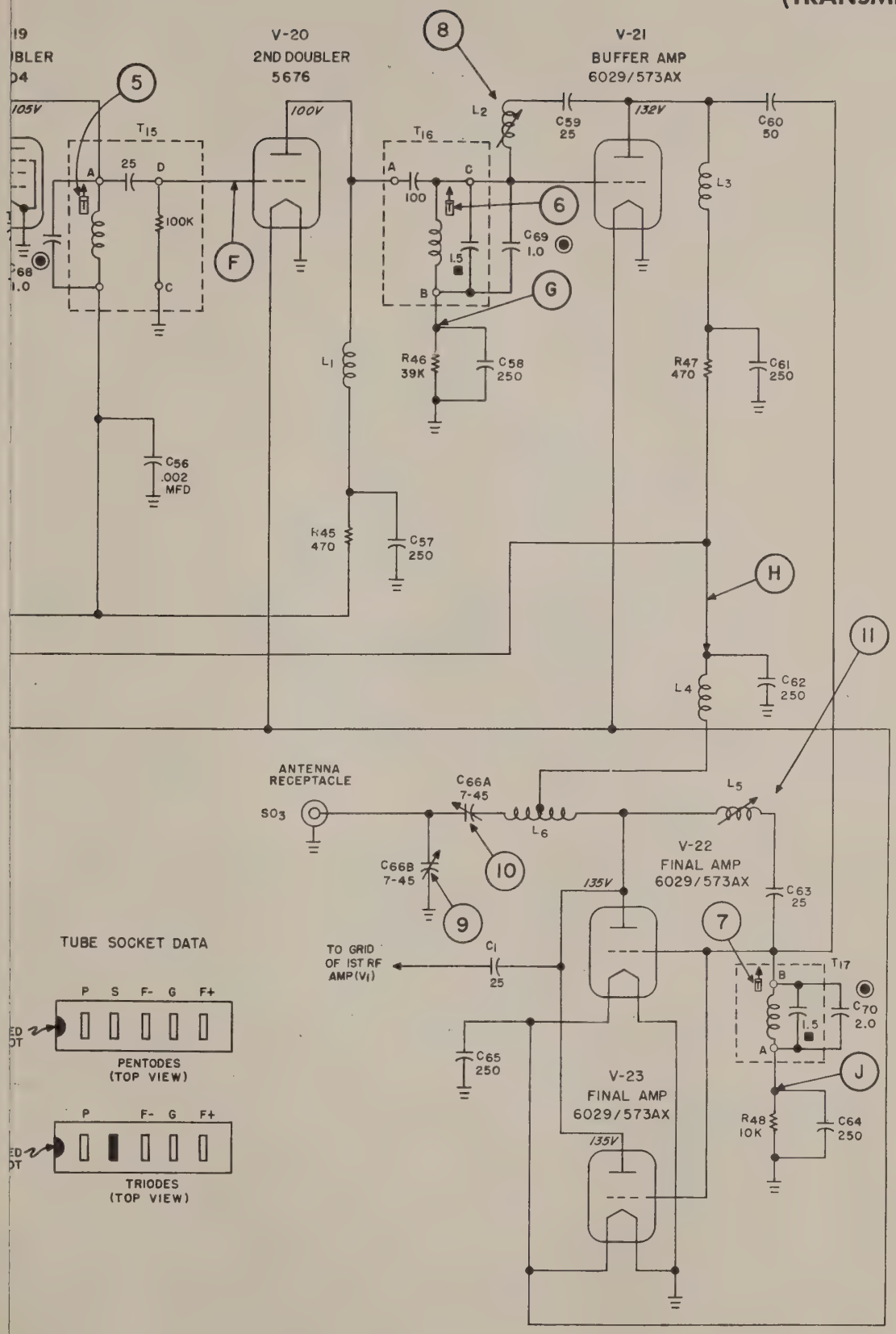
   ON VEHICLES WITH NEGATIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT NEGATIVE (–) SIGN ON VIBRATOR FACES REAR OF CASE.

⏚ CHASSIS



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

MODEL HT-26
RUN 1
(TRANSMITTER)



LUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIA-
NS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE
ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE
THE PART BEING REPLACED.

89E550-A

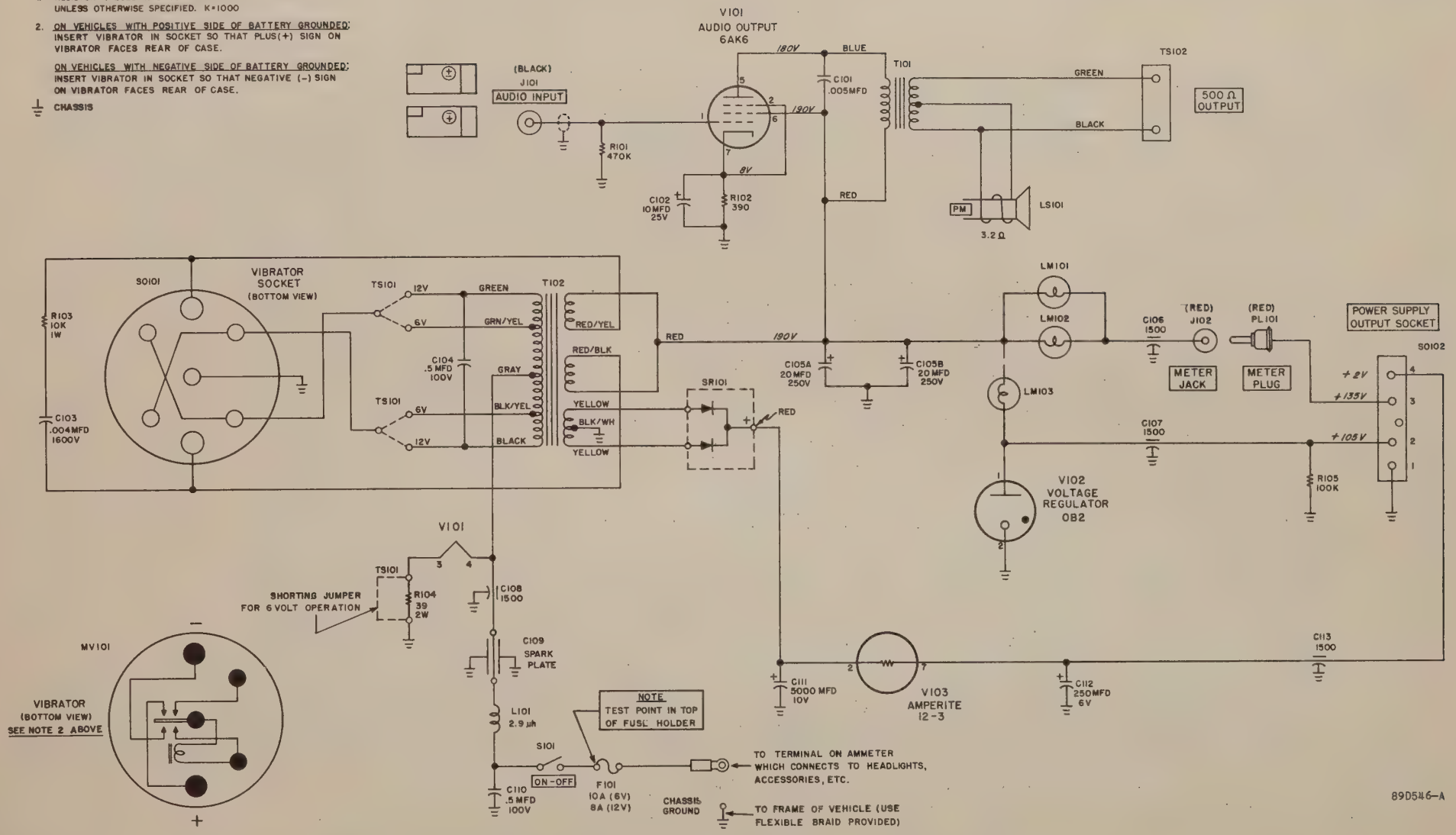
MODEL HT-26
RUN 1
(POWER SUPPLY & AUDIO OUTPUT)

NOTES

1. RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED. K=1000
2. ON VEHICLES WITH POSITIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT PLUS(+) SIGN ON VIBRATOR FACES REAR OF CASE.

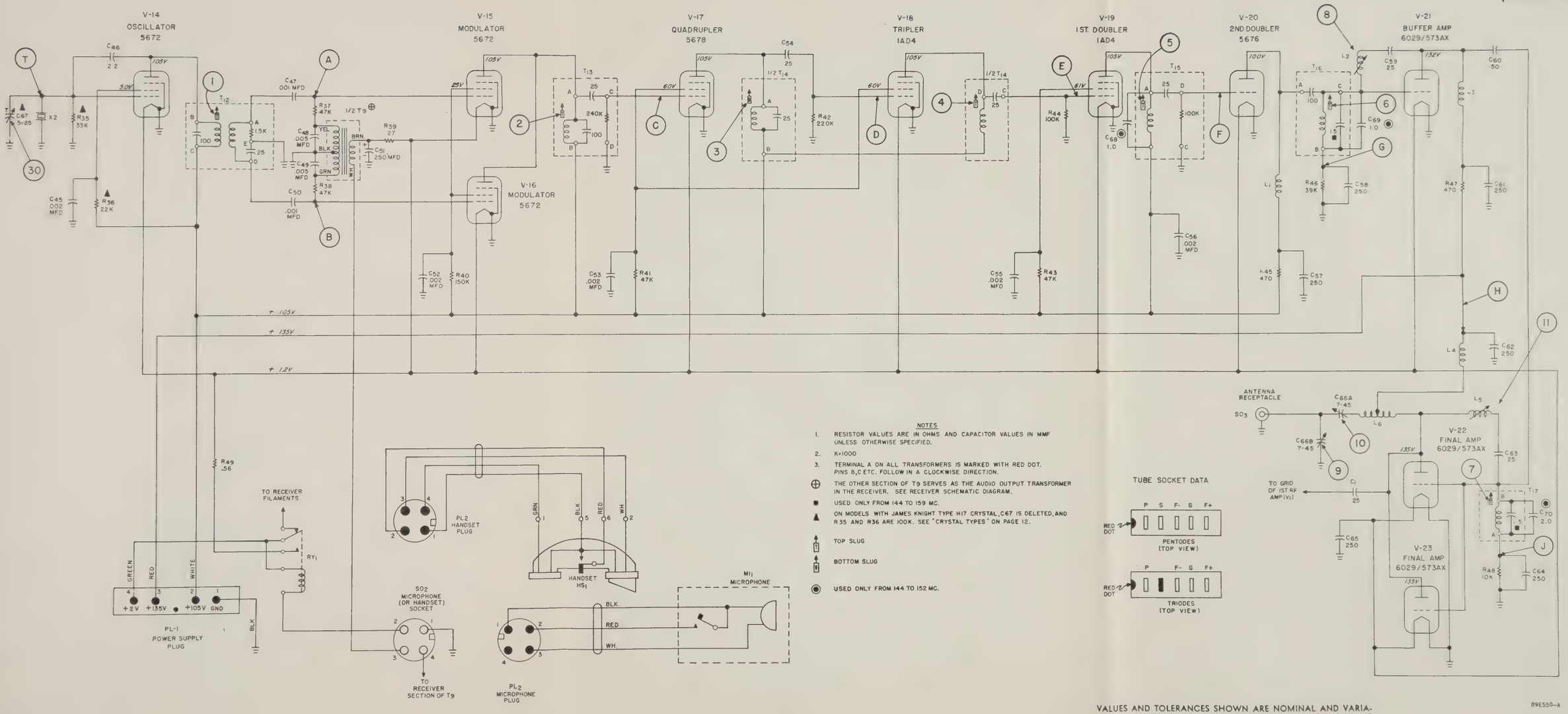
   ON VEHICLES WITH NEGATIVE SIDE OF BATTERY GROUNDED; INSERT VIBRATOR IN SOCKET SO THAT NEGATIVE (-) SIGN ON VIBRATOR FACES REAR OF CASE.

⏚ CHASSIS



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

MODEL HT-26
RUN 1
(TRANSMITTER)



NOTES

1. RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED.
2. K=1000
3. TERMINAL A ON ALL TRANSFORMERS IS MARKED WITH RED DOT. PINS B,C ETC. FOLLOW IN A CLOCKWISE DIRECTION.

⊕ THE OTHER SECTION OF T9 SERVES AS THE AUDIO OUTPUT TRANSFORMER IN THE RECEIVER. SEE RECEIVER SCHEMATIC DIAGRAM.

■ USED ONLY FROM 144 TO 159 MC.

▲ ON MODELS WITH JAMES KNIGHT TYPE HI7 CRYSTAL, C67 IS DELETED, AND R35 AND R36 ARE 100K. SEE "CRYSTAL TYPES" ON PAGE 12.

TOP SLUG

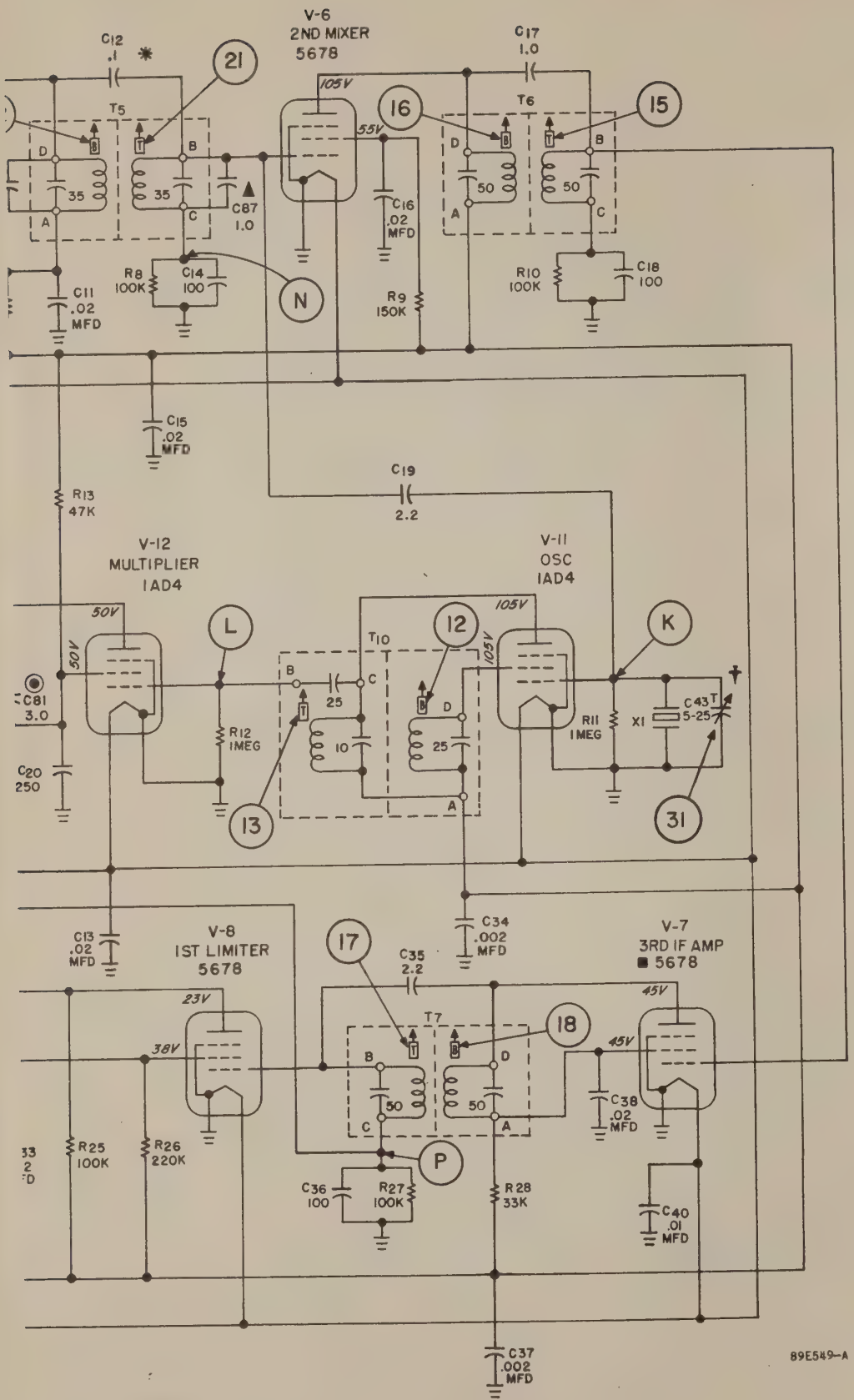
BOTTOM SLUG

◉ USED ONLY FROM 144 TO 152 MC.

TUBE SOCKET DATA

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89E550-A



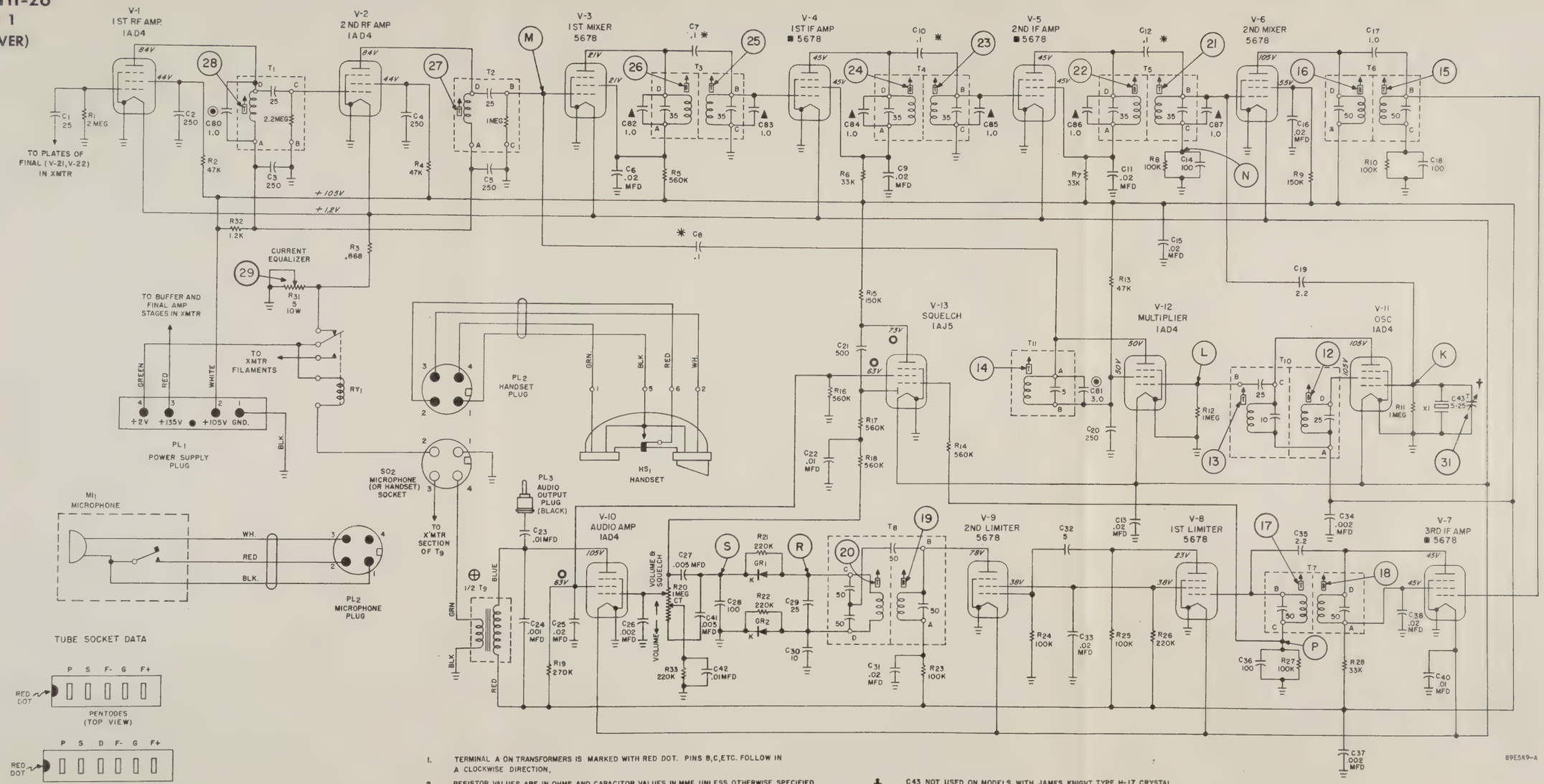
IT TYPE H-17 CRYSTAL.

RE SUBSTITUTED FOR TYPE 5678
ACEMENT ON THESE SETS, EITHER
IE SAME TUBE TYPE FOUND IN THE
5678, IT MAY BE NECESSARY TO
MMICK CAPACITOR IN THE PLATE
REVENT OSCILLATION CAUSED BY
NOT USE TYPE 2E32 TO REPLACE

1ST IF = XTAL FREQ – 1.7 MC
2ND IF = 1.7 MC

NOTES

MODEL HT-26
RUN 1
(RECEIVER)



1. TERMINAL A ON TRANSFORMERS IS MARKED WITH RED DOT. PINS B,C,ETC. FOLLOW IN A CLOCKWISE DIRECTION.
2. RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED.
3. K=1000
- ✱ GIMMICK
- ⊕ THE OTHER SECTION OF T9 SERVES AS A MODULATION TRANSFORMER IN THE TRANSMITTER. SEE TRANSMITTER SCHEMATIC DIAGRAM.
- ○ WITH VOLUME/SQUELCH CONTROL SET FULLY CLOCKWISE.
- ▲ USED ONLY FROM 144 TO 145 MC.
- ◉ USED ONLY FROM 144 TO 152 MC.
- † C43 NOT USED ON MODELS WITH JAMES KNIGHT TYPE H-17 CRYSTAL.
- ■ NOTE: ON SOME SETS, TYPE 2E32 TUBES WERE SUBSTITUTED FOR TYPE 5678 FOR V-4, V-5, AND V-7. WHEN MAKING REPLACEMENT ON THESE SETS, EITHER TUBE TYPE MAY BE USED. IF POSSIBLE USE THE SAME TUBE TYPE FOUND IN THE SET. WHEN REPLACING TYPE 2E32 WITH TYPE 5678, IT MAY BE NECESSARY TO SLIGHTLY LOOSEN THE COUPLING OF THE GIMMICK CAPACITOR IN THE PLATE CIRCUIT OF THE TUBE BEING REPLACED TO PREVENT OSCILLATION CAUSED BY THE SLIGHTLY HIGHER GAIN OF TYPE 5678. DO NOT USE TYPE 2E32 TO REPLACE TYPE 5678.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

1ST IF = XTAL FREQ – 1.7 MC
2ND IF = 1.7 MC

89E549-A

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X1163

1253 – RUN 1



HT-30
MARK 1

the hallicrafters co.

MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.



Figure 1. Hallicrafters Model HT-30 Transmitter-Exciter

SECTION I
GENERAL

1-1. DESCRIPTION

The Hallicrafters Model HT-30 is a precision built transmitter-exciter capable of SSB (single side band with suppressed carrier), AM, or CW transmission in the 80, 40, 20, and 10 meter bands. The transmitter-exciter can represent the complete transmitting complement at an amateur station. A power source, an antenna and a key or microphone are the only external requirements for immediate "on the air" operation.

This unit may be used as a complete self-contained transmitter, or as an exciter for a linear power amplifier such as the Hallicrafter Model HT-31. If other linear amplifiers are employed, they should be capable of approaching the high performance standards of the HT-31 to utilize the full capabilities of the HT-30. Maximum power output ratings of the HT-30 are: SSB, 35 watts P.E.P. (peak envelope power); CW 35 watts; and AM 9 watts.

Prominent features of the HT-30 transmitter-exciter are: built-in highly stable V.F.O.; full function control; crystal-like stability (0.009%), T.V.I. suppression, and for all practical purposes, complete suppression of spurious frequencies. The circuitry employs the proven r-f selective filter system used by major commercial communications companies. This system assures continued suppression of unwanted side band energy and spurious emissions. Hum, noise and unwanted side band are down 40 db or more, while undesired beat frequencies are down at least 60 db.

Throughout the design of the HT-30, ease of operation has been stressed in addition to high performance standards. Provision is made for frequency control either by means of the built in V.F.O. (variable frequency oscillator) or by means of a crystal in the built-in crystal holder for fixed frequency operation. The large V.F.O. dial reads directly in kilocycles. Each black minor marker on the skirt of the FREQUENCY control is equivalent to approximately 200 cycles on the 80, 40, and 20 meter bands. Each red minor marker is equivalent to approximately 800 cycles on the 10 meter band. One control performs full band switching for the 80, 40, 20, and 10 meter bands, enabling the operator to shift frequency without the use of plug-in coils. SSB, DSB or CW operation may be selected by means of a single switch on the front panel. The built-in VOX (voice controlled transmission) system with ad-

justable delay and anti-trip features, is designed to control your receiver, the transmitter-exciter, and when used, a linear power amplifier. Two triode stages of resistance coupled speech amplifiers provide more than ample gain for low level crystal or dynamic microphones. Air circulation and high internal temperature protection is maintained by a power driven fan mounted under the unit's cover. The entire unit is ruggedly constructed and built to the same high precision standards that have made Hallicrafters a leader in the communications field.

1-2. T.V.I. (Television Interference) SUPPRESSION

Exceptional engineering ingenuity has been employed throughout the design and construction of the HT-30 to eliminate spurious and harmonic radiations that may cause television interference. The TVI problem was given full consideration in the design of every circuit as well as in the selection and layout of parts. More than adequate filtering has been provided for control circuits and AC power lines. Low impedance paths to ground for all harmonic frequencies are provided by specially constructed tuned circuits. Components were specifically selected to avoid self resonance at harmonic frequencies and arranged to prevent parasitic oscillation.

Another important T.V.I. proofing feature is employed in the output coupling circuit of the final amplifier. The tuned output circuit is a pi network that has inherently excellent harmonic suppression ability. The unique design of this network is such that the conventional loading control is unnecessary and only the final tank tuning need be adjusted. The pi network is connected to a coaxial connector and permits the use of all antenna systems having an impedance within the range of 50 to 70 ohms. In addition to these factory installed precautions, a 50-ohm low pass TVI filter, which connects in series with the transmitter-exciter output, is available as an accessory. This unit may be obtained from your Hallicrafters dealer under part number 1X2621.

The Model HT-30 transmitter-exciter, as received from the factory, has had every advantage of Hallicrafters advanced engineering to minimize television interference. There are, however, some types of TVI that cannot be prevented within the transmitter itself. For example, when a television receiver is located in the immediate vicinity of the transmitter-exciter it is entirely possible that a fundamental signal will reach the input grid of the receiver in sufficient strength to cause a slight amount of interference. In such cases, it will be necessary to install a filter or trap at the television receiver. If the interfering signal does not enter the television receiver through the antenna, special shielding or filters on the TV receiver may be necessary. For a more complete discussion of measures that may be used to handle these special television interference problems, refer to the booklet entitled "TELEVISION INTERFERENCE", written and published by the Remington Rand Laboratory of Advanced Research, Norwalk, Conn.

SECTION II
INSTALLATION

2-1. UNPACKING

After unpacking the HT-30 Transmitter-exciter, examine it closely for any possible damage which may have occurred during transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for any special instructions before removing or destroying them.

2-2. LOCATION

Although the Model HT-30 transmitter-exciter is provided with a built-in power driven fan for cooling purposes, avoid excessively warm locations such as those near radiators and heating vents. The unit should be placed in a location that provides adequate space around it, permitting free circulation of air through the cabinet openings.

2-3. POWER SOURCE

The transmitter-exciter is designed to operate on 105 to 125 volt, 50-60 cycle AC current.

IMPORTANT: If in doubt about your power source, contact your local power company prior to inserting the power cord into an AC power outlet. Plugging the power cord into the wrong power source can cause extensive damage to the unit, requiring costly repairs.

2-4. REAR CHASSIS CONNECTIONS

(See Figure 2)

All external connections to the HT-30 transmitter-exciter are made to the connectors and terminals provided on the rear of the chassis.

A. MIKE

The MIKE connector will accommodate any high impedance microphone (crystal, dynamic, etc.) that has an output level of -56 db or higher. The microphone cable should be fitted with an Amphenol type FC1F connector. The MIKE connector has a unique mechanical feature in that the center contact is spring tensioned and upon the removal of the microphone connector, the input circuit of the first audio stage is automatically shorted out.

B. TERMINAL LOAD

A terminal board is provided at the rear of the chassis to connect the HT-30 transmitter-exciter into your present system. The instructions given below may be modified to suit your particular needs.

KEY (terminals 1 and 2) - For CW operation, the hand key or "bug" is connected to terminals 1 and 2 of the terminal board. Terminal 1 is internally grounded in the transmitter-exciter. When the key is up, cut-off bias is maintained at the V.F.O.

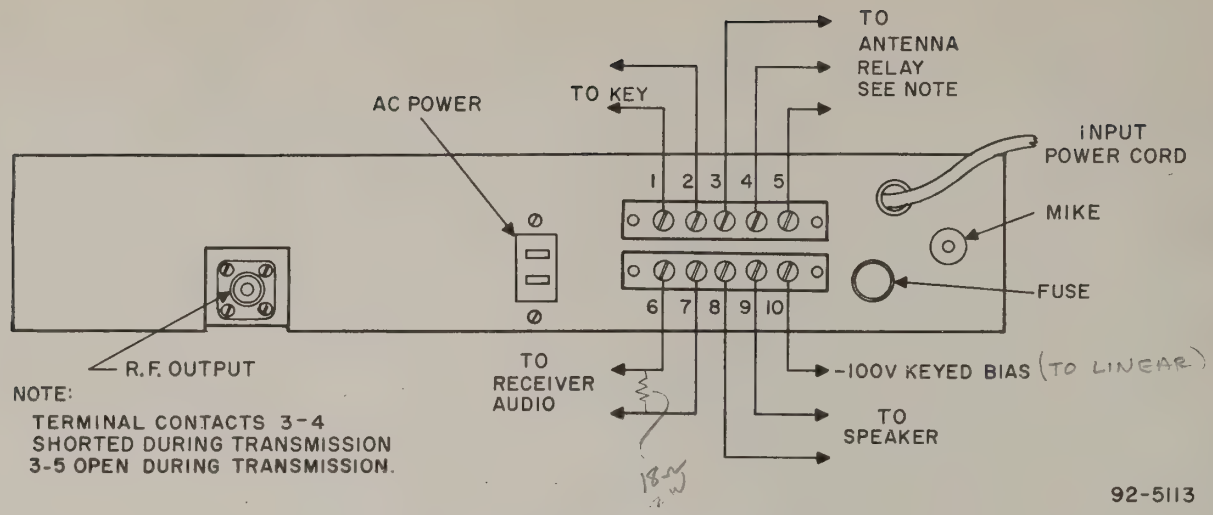


Figure 2. Connections to Rear of Chassis

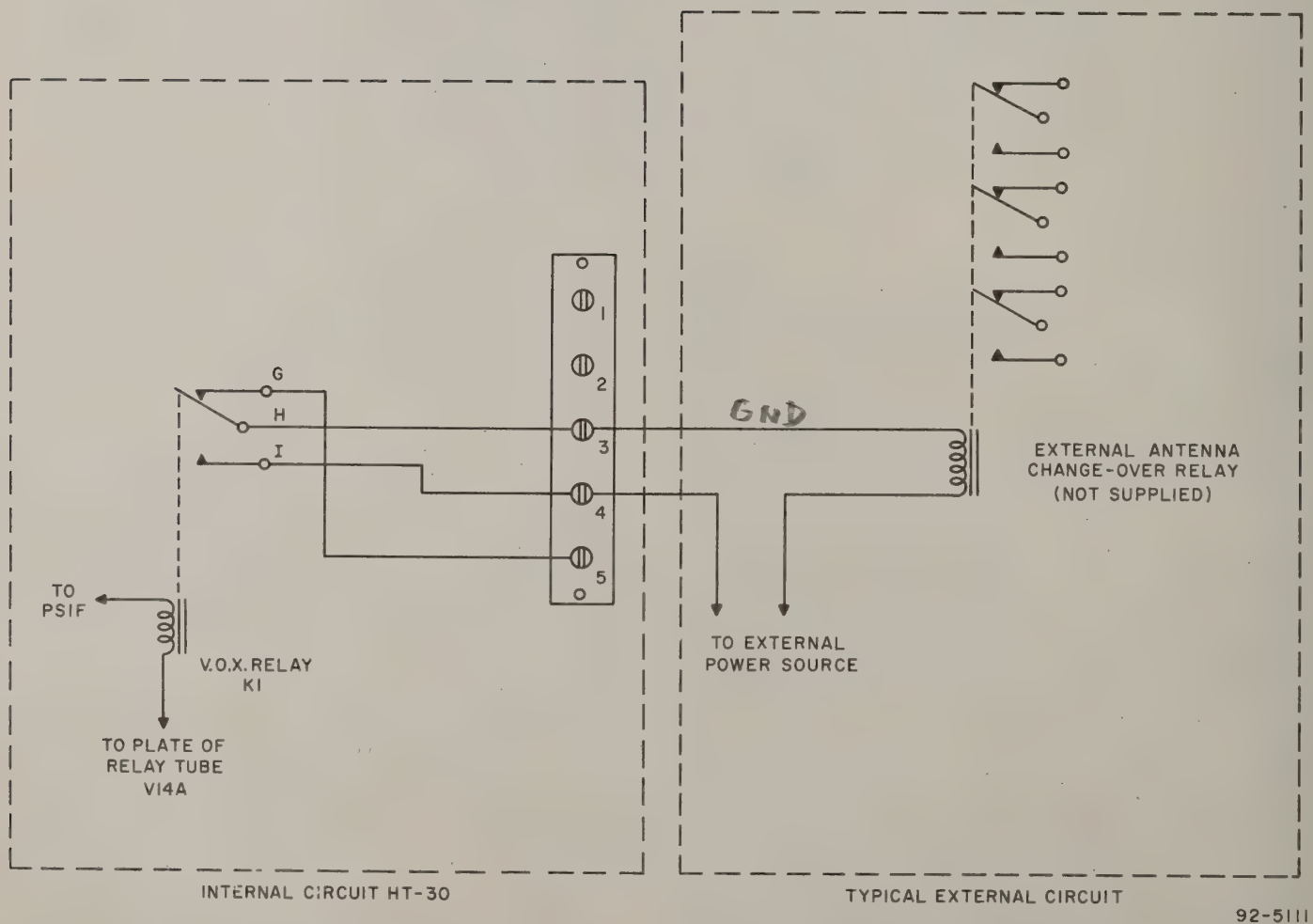


Figure 3. Terminal Board Connections to Antenna Change-over Relay

mixer and driver stages. Closing the key removes the cut-off bias providing signal excitation to the succeeding rf amplifier stages.

IMPORTANT: Never close the key when operating in SSB or AM.

ANTENNA RELAY (terminals 3, 4, and 5) - An external antenna change-over relay may be employed by utilizing terminals 3, 4, and 5 on the terminal board. These terminals are internally connected to spare contacts on the VOX RELAY of the transmitter-exciter. Fig. 3 illustrates typical connections of an antenna change-over relay to the terminal board. During periods of transmission, the VOX RELAY shorts out terminals 3 and 4 enabling the external power source to activate the antenna change-over relay. The voltage required of the external power source is dependent upon the type of change-over relay used.

RECEIVER AUDIO (terminals 6 and 7) and SPEAKER (terminals 8 and 9) - Connect the audio output of the stations receiver directly to terminals 6 and 7 of the terminal board. An 18 ohm, 2 watt resistor should also be connected across the receiver audio output to maintain a load at all times. The receiver speaker is connected directly to terminals 8 and 9. Connecting the receiver and speaker in this manner prevents the actuating of the transmitter-exciter's VOX circuit by incoming audio signals from the receiver and also disconnects the receiver output to the speaker when the transmitter-exciter is on the air.

NEGATIVE 100V KEYED BIAS (terminal 10) - The transmitter-exciter provides -100 volts to terminal 10. This feature was included to provide a convenient method of supplying control bias to an external linear power amplifier during receiving periods.

C. AC POWER

This connector provides 105 to 125 volt, 50-60 cycle AC for the built-in fan.

D. R.F. OUTPUT

This is a coaxial connector which connects the transmitter-exciter to the antenna system or a linear amplifier. The connecting cable (52 ohm coax) should be fitted with an Amphenol type 83-1SP connector or its equivalent. The selection of the type of antenna and coupling will depend upon the frequencies used and the purpose of operation. Refer to the ARRL ANTENNA HANDBOOK for detailed information concerning transmitting antennas.

2-5. CRYSTAL INSTALLATION

Provision has been made for the installation of a crystal if fixed frequency crystal-controlled operation is desired. Switching from the built-in VFO to the crystal may be accomplished by means of the "VFO-XTAL" switch on the front panel. The location of the crystal holder socket is shown in Fig. 5. Crystals must have a pin spacing of .486" and a pin diameter of .093". Data pertaining to crystal frequency selection is given in paragraph 4-8A.

NOTE

Quartz crystals are not supplied with the Model HT-30 Transmitter-Exciter or stocked by The Hallicrafters Company. Crystals employed in the HT-30 must have a tolerance of .005%. Most of the standard types commercially available are satisfactory for use in this unit.

SECTION III
FUNCTION OF OPERATING CONTROLS

3-1. POWER

The POWER control is a four position rotary switch which applies power to the unit in stages for warm up and operation.

In the "POWER OFF" position, the unit is inoperative. As the control is turned clockwise to any of the other three positions, the transmitter-exciter is turned on.

In the "WARM UP" position of the control, power is applied to all tube filaments; and plate power to all stages except the speaker amplifier, relay tube, and audio stages. When starting from the "POWER OFF" position, this control should remain at the "WARM UP" position for a minimum of 30 seconds.

The "STANDBY" position of the control is used during receiving periods of M.O.X. and C.W. operation. Placing the control in this position from "TRANSMIT", removes plate voltage from the 1st and 2nd audio amplifiers, the audio phase splitter, vox amplifier, relay tube, and speaker amplifier stages. Grid bias is also placed on the driver and VFO mixer stages making these circuits inoperative.

The "TRANSMIT" position reduces the bias on the driver stage and applies plate power to those stages in which power was removed while in the "STANDBY" position.

3-2. FUNCTION

The FUNCTION control is a four position rotary switch which selects CW, DSB, UPPER or LOWER SIDEBAND type of transmission as desired by the operator. An analysis of the FUNCTION switch operation is given in paragraph 5-5.

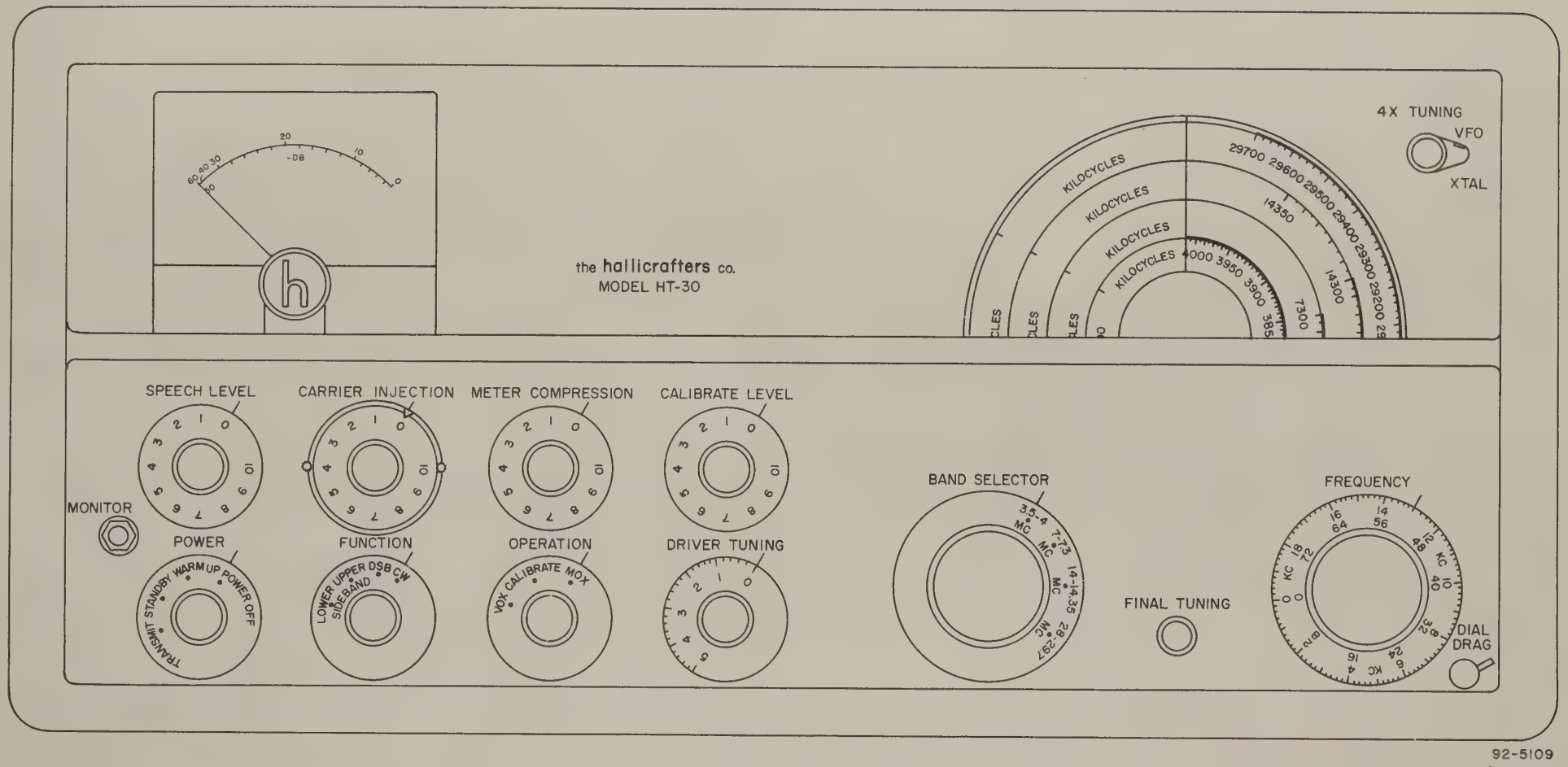


Figure 4. Front Panel Controls

3-3. OPERATION

This control is a three position rotary switch which selects the mode of operation (VOX or MOX). The "CALIBRATE" position is used in conjunction with the CALIBRATE LEVEL control. (See paragraph 3-12.)

The "MOX" position energizes the transmitter control relay to the transmit position. This position of the OPERATION switch is used when manual control of transmission is desired. The POWER switch must be set to the "STANDBY" position during receiving periods.

In the "CALIBRATE" position, the transmitter-exciter control relay (VOX RELAY) is de-energized, permitting normal receiving operation with an antenna change-over relay (if used) in a receive position. This condition is also desirable since the "amount" of grid bias applied to the driver and vfo mixer stages can now be controlled by the setting of the CALIBRATE LEVEL control. A low power output can be obtained from the final amplifier stage for tuning purposes by adjusting the CALIBRATE LEVEL control. See paragraph 3-12.

In the "VOX" position, the transmitter control relay is operated by voice energy from the microphone. Placing the OPERATION control in this position applies B+ to the speaker amplifier and relay tube. The relay tube is biased at cut-off and will not energize the VOX RELAY until signal excitation is received from the audio amplifier and vox amplifier stages.

3-4. DRIVER TUNING

This control is a variable capacitor in the vfo mixer plate, rf amplifier grid, and driver plate circuits, and will resonate the circuits to any frequency in the 80, 40, 20, and 10 meter bands.

3-5. BAND SELECTOR

The BAND SELECTOR control is a four position rotary switch which selects the proper combination of tuned circuits and stages for the desired frequency band. It also selects the correct crystal oscillator (1675 or 1775 KC) to produce the desired sideband when the FUNCTION switch is set at either "UPPER" or "LOWER SIDEBAND".

In the "3.5-4 MC" and "7-7.3 MC" position, the 5.210 mc. osc., 10.420 mc. osc., the 5.2/10.42 mc. mixer, and 4 x multiplier stages are biased to cut-off.

The "14-14.35 MC" position removes bias from the 10.420 mc. osc. and 5.2/10.42 mc. mixer stage.

In the "28-29.7 MC" position, bias is applied to the 10.420 mc. osc. stage, and removed from the 5.210 mc. osc., and 4 x multiplier stages.

The frequency range of each position of the BAND SELECTOR control is indicated directly on the control.

3-6. FINAL TUNING

This control is a variable capacitor in the final amplifier tank circuit and will resonate the circuit to the operating frequency of the selected band.

3-7. FREQUENCY

The FREQUENCY control is a variable capacitor which sets the VFO frequency. The VFO has a frequency range of 5,225 kilocycles to 5,725 kilocycles. Due to mixing circuits, the VFO will set the transmitter-exciter to the desired operating frequency as indicated on the dial in any of the four bands. Each black minor marker on the skirt of the FREQUENCY control is equivalent to approximately 200 cycles on the 80, 40, and 20 meter bands. Each red minor marker is equivalent to approximately 800 cycles on the 10 meter band.

3-8. DIAL DRAG

This is a mechanical brake which can be adjusted either to lock or apply drag to the FREQUENCY control to avoid accidental rotation of the control during operation.

3-9. SPEECH LEVEL

This control is a potentiometer connected in the grid circuit of the second audio amplifier stage and adjusts the amount of audio drive to the balanced modulator stage. It has sufficient range to permit adjustment for any desired percentage of modulation.

3-10. CARRIER INJECTION

The CARRIER INJECTION control is a potentiometer in the cathode circuit of the balanced modulator. The amount of carrier in the output signal is determined by the control setting. A mechanical reference indicator stop is also provided with this control. The adjustment of the stop has been made at the factory and probably will not require any re-adjustment throughout the service of the transmitter-exciter. The stop is rotated and locked in place at the exact setting of the CARRIER INJECTION control which produces complete carrier suppression. This feature enables the operator to immediately locate the proper setting of the CARRIER INJECTION control when returning to SSB operation.

3-11. METER COMPRESSION

This is a potentiometer which allows the operator to set the meter at maximum deflection "0" db for desired output level when establishing proper drive levels in the transmitter-exciter. (See LEVEL INDICATOR METER, paragraph 3-16.)

3-12. CALIBRATE LEVEL

The CALIBRATE LEVEL control is a potentiometer used to select the amount of bias applied to the driver and vfo mixer stage when the OPERATION control is set in the "CALIBRATE" position. The use of the CALIBRATE LEVEL control enables the operator to easily set the transmitter-exciter on a desired net frequency. To obtain maximum results from this feature of your transmitter-exciter, the following procedure is recommended.

1. Tune in the desired SSB net frequency on your station receiver. Remove the receiver supplied carrier by switching off the receiver bfo.

2. Set the OPERATION control to the "CALIBRATE" position, thus de-energizing the carrier control

relay and placing the driver and vfo mixer stage at cut-off. Gradually reduce the cut-off bias by slowly advancing the CALIBRATE LEVEL control and vary the output frequency of the transmitter until the receiver SSB signal is clear. Set the OPERATION switch to the desired mode of operation (VOX or MOX). By utilizing the transmitter output frequency instead of the bfo as a carrier insertion oscillator, the transmitter is set exactly on the net frequency.

3. Return the CALIBRATE LEVEL control to "0". Turn on the receiver bfo. The adjustment is now complete.

NOTE

If sufficient carrier is present in the received SSB signal, the transmitter-exciter may zero beat to the incoming frequency without the use of the receiver bfo.

3-13. VFO-XTAL

This control is a two position rotary switch which selects VFO or crystal controlled operation. When in the "XTAL" position, bias is placed on the VFO stage making it inoperative. Data on crystal selection is given in paragraph 4-8A.

3-14. 4X TUNING

The 4 X TUNING control is a variable capacitor which tunes the plate circuit of the quadrupler stage and the three following tuned circuits to four times the VFO or crystal frequency, in 10 meter operations only.

3-15. MONITOR

This is a phone jack which allows monitoring of the received signal with a headset. Inserting the plug of a headset in the jack will automatically cut off the receiver speaker when it is connected as instructed in paragraph 2-4.

3-16. LEVEL INDICATOR METER

The LEVEL INDICATOR METER indicates the output of the transmitter-exciter in db below "0" db, enabling the adjusting of the transmitter-exciter for correct output (drive level required for a linear amplifier or approximate rated output for "barefoot" operation). Tuning of the Model HT-30 has been simplified by the design of the front panel meter circuit. The meter scale is compressed to enable low-level signals to produce a useable indication, yet strong signals do not drive the meter pointer off scale. This feature gives the meter a wide useable dynamic range which is not possible to obtain with a linear scale. The desired amount of compression may be obtained by adjusting the METER COMPRESSION control on the front panel. The output reading on the LEVEL INDICATOR METER can be shifted to read full scale ("0" db) and any level below can easily be read on the meter. A log of METER COMPRESSION control settings, for normal output into loads of controlled and reproducible characteristics, will aid in re-establishing proper drive levels and determining the proper operation of the unit. The log should be recorded at various frequencies and modes of operation.

SECTION IV
TUNING PROCEDURE

4-1. GENERAL

The tuning procedure for CW operation will first be presented since AM(DSB) and SSB tuning procedures are modifications of that required for CW operation.

4-2. INITIAL CONTROL SETTINGS

Set the front panel controls to their starting positions as outlined below.

POWER	WARM UP
OPERATION	MOX
FUNCTION	DSB
SPEECH LEVEL	0
CARRIER INJECTION	0
METER COMPRESSION	5
CALIBRATE LEVEL	0
DRIVER TUNING	3
FINAL TUNING	CENTER OF ROTATION
BAND SELECTOR	DESIRED BAND
FREQUENCY	DESIRED FREQUENCY
VFO-XTAL	APPROPRIATE POSITION
4 X TUNING	CENTER OF ROTATION

4-3. CW TUNING

The tuning procedure of Model HT-30 for CW operation is as follows:

1. Connect a 50 ohm impedance to the R. F. OUTPUT connector on the transmitter-exciter. The impedance may be an antenna or a properly tuned linear amplifier. However, a 50 ohm non-reactive load of at least 50 watts dissipation is advised for initial tuning.

2. Set the POWER switch to the "TRANSMIT" position.

3. Rotate the CARRIER INJECTION control to approximately 4.

CAUTION

When using the Model HT-30 to drive a linear amplifier, the CARRIER INJECTION control should not be advanced any farther than required to supply the correct amount of drive. If Hallicrafters HT-31 linear amplifier is being used,

refer to page 4 of the HT-31 Instruction Book for grid loading instructions.

4. Tune the driver and final amplifier stages by adjusting the DRIVER TUNING and FINAL TUNING control for maximum deflection on the front panel meter.

   When tuning on the 10 meter band, the 4X TUNING control must also be adjusted for maximum deflection since the quadrupler stage has been placed in the circuit by the BAND SELECTOR switch. Prior to adjusting the 4 X TUNING control, rotate the FINAL TUNING control completely clockwise; then the DRIVER TUNING and 4 X TUNING must be adjusted simultaneously. While slowly rotating the 4 X TUNING control, "rock" the DRIVER TUNING control and observe the front panel meter. Set both controls at a position resulting in maximum output. After peaking the driver and quadrupler stages, the FINAL TUNING control should now be adjusted for maximum deflection on the panel meter.

NOTE

As full meter deflection ("0" db) is approached while tuning the driver and final amplifier stages (and quadrupler when on 10 meters), the amount of carrier injection should be decreased to maintain a level below "0" db. This will enable more accurate tuning and prevent "pinning" the needle of the panel meter.

5. Rotate the CARRIER INJECTION control fully counterclockwise and set at "0".

6. Advance the CARRIER INJECTION control slowly while observing the meter. Set the control at a point where further rotation does not cause an appreciable increase in the meter reading. Adjust the METER COMPRESSION control (counterclockwise) to set the indicator of the panel meter exactly on "0" db. Slowly rotate the CARRIER INJECTION control counterclockwise 1 db. Readjust the METER COMPRESSION control to maintain the panel meter indicator on "0" db. At this position, the maximum allowable drive excitation is being applied to the final amplifier stage.

7. Recheck the setting of the DRIVER TUNING and FINAL TUNING controls (also 4 X TUNING CONTROL if on 10 meters) for maximum meter deflection.

8. If there is a noticeable increase in meter deflection (indicator reading off scale) after performing step 7, repeat steps 5, 6 and 7 until step 7 results in no appreciable change in meter deflection.

9. Set the FUNCTION switch to "CW" position. Proceed with CW transmission.

4-4. AM (DSB) TUNING - ALTERNATE METHOD

To tune the transmitter-exciter for AM transmission, proceed as follows:

1. Perform the first eight steps of the CW tuning procedure, paragraph 4-3.

2. Reduce the CARRIER INJECTION control setting until the meter reads approximately 3 db. This reduces the rf excitation to the final amplifier to approximately one-half that employed in CW transmission and to the maximum level for 100% modulation.

3. Set the OPERATION switch to "MOX" or "VOX" as desired.

4. With another station monitoring the output of the transmitter-exciter, adjust the amount of modulation by slowly advancing the SPEECH LEVEL control. Set the SPEECH LEVEL control just below that setting which produces distortion (over 100% modulation) in the transmitter-exciter output. Proceed with AM transmission.

4-5. AM (DSB) TUNING - PREFERRED METHOD

Adjusting the SPEECH LEVEL control for 100% modulation can be accomplished by using the front panel LEVEL INDICATOR meter and an audio tone. The audio tone may be obtained by tuning your station receiver to an unmodulated signal and setting the bfo for an approximate 1000 cycle tone or any tone pleasing to the ear. Set the audio output of the station receiver to your normal speaking voice level. Place your microphone in front of the receiver speaker at the same equivalent distance as normally used when speaking into the microphone. Then proceed as follows:

1. Perform the first two steps of the AM tuning procedure, paragraph 4-4.

2. Slowly advance the SPEECH LEVEL control while observing the front panel LEVEL INDICATOR meter. The meter reading will decrease, reach a null, then begin to increase. The null corresponds to approximately 100% modulation and the increase is over 100% modulation. Reduce the setting of the SPEECH LEVEL control counterclockwise until the meter is at the base of the null. Note the meter reading, then continue reducing the setting one-half db past the null point.

3. Set the OPERATION switch to "VOX" or "MOX" as desired.

4. Set the station receiver to the operating frequency and proceed with AM transmission.

4-6. SSB TUNING

The tuning procedure of the transmitter-exciter for SSB operation is as follows:

1. Tune the transmitter-exciter as instructed for CW operation, paragraph 4-3.

2. Set the FUNCTION switch to "UPPER" or "LOWER" SIDEBAND as desired.

3. Set the CARRIER INJECTION control to "0" (minimum carrier).

4. Set the OPERATION switch to "MOX" or "VOX" as desired.

5. While monitoring the transmitter-exciter output, proceed with SSB transmission, setting the SPEECH LEVEL control to the highest setting which does not produce distortion. The SSB tuning is now complete.

4-7. SSB TRANSMISSION WITH CARRIER

If it is desired to transmit a SSB signal with a carrier, proceed as follows:

1. Tune the transmitter-exciter as instructed for SSB (paragraph 4-6).

2. Advance the CARRIER INJECTION control injecting the desired amount of carrier into the output of the transmitter-exciter.

4-8. ADDITIONAL TUNING INFORMATION FOR 11 METERS AND 80 METERS

The characteristics of the heterodyne systems in a single sideband transmitter often result in the presence of a few spurious harmonics of the 1725 kc and 6985 kc IF's which fall near or within the 80-meter and 11-meter amateur bands, respectively. Extreme care has been taken to reduce the level of these spurious frequencies to a negligible level when the HT-30 is properly tuned. However there is a possibility of tuning the output to one of these highly attenuated spurious harmonic frequencies (3450 kc and 27,940 kc) unless the following precautions are followed.

1. CARRIER INJECTION, DRIVER TUNING, and FINAL TUNING controls.

   When adjusting carrier injection, advance the CARRIER INJECTION control only as far clockwise as necessary for final tune-up, and when adjusting the DRIVER TUNING and FINAL TUNING controls begin at the high frequency end (fully counterclockwise) and proceed downward in frequency.

2. Carrier Suppression.

   After initial tune-up, set the FUNCTION switch to DSB, the CARRIER INJECTION control at 0, and the METER COMPRESSION control at 10, If the carrier suppression indicated on the meter is not between 25 and 30 db, proceed as follows:

   a. Loosen the two thumb screws at the CARRIER INJECTION control, but first note the setting of the mechanical reference indicator with respect to the calibration numbers on the control.

   b. Rock the CARRIER INJECTION control back and forth for maximum supression, and compare it with the previously marked knob setting.

   c. Adjust the 50-kc amplitude balance control (R9, see Fig. 5) for maximum suppression.

   d. Repeat step b.

   e. Adjust the phase balance control (R10, Fig. 5) for maximum suppression.

   f. Repeat step b.

   g. Hold the CARRIER INJECTION control, rotate the mechanical reference indicator in a counterclockwise direction up to the dial calibration of maximum suppression, and lock the two thumb screws.

4-9. CRYSTAL-CONTROLLED OPERATION

When crystal-controlled operation is desired, insert a crystal into the crystal socket (Fig. 5) and place the VFO-XTAL switch in the "XTAL" position. The tune-up procedure for crystal-controlled operation is identical to VFO operation.

A. SELECTION OF CRYSTAL FREQUENCY

In crystal-controlled operation, the VFO is rendered inoperative and its normal function is replaced by the crystal oscillator; therefore, the crystal frequency must be within the range (5.225 mc to 5.725 mc) originally covered by the VFO.

To obtain a desired operating frequency, select the crystal frequency (5.225 mc to 5.725 mc) by using the formulas listed below. The crystal and operating fre-= quencies must be in megacycles.

80 meters; Crystal Frequency = Operating Frequency +1.725 mc
40 meters; Crystal Frequency = Operating Frequency -1.725 mc
20 meters; Crystal Frequency = Operating Frequency -8.695 mc
10 meters; Crystal Frequency = (Operating Frequency -6.935 mc) ÷ 4

B. TYPICAL CRYSTAL FREQUENCIES

Typical examples of crystal frequencies required to obtain various operating frequencies is listed in the crystal frequency table. In many cases, one crystal frequency can be used on all bands with the resultant frequency still remaining within the band limits. The resultant operating frequencies marked with an asterisk indicate that these frequencies are out of the band limits.

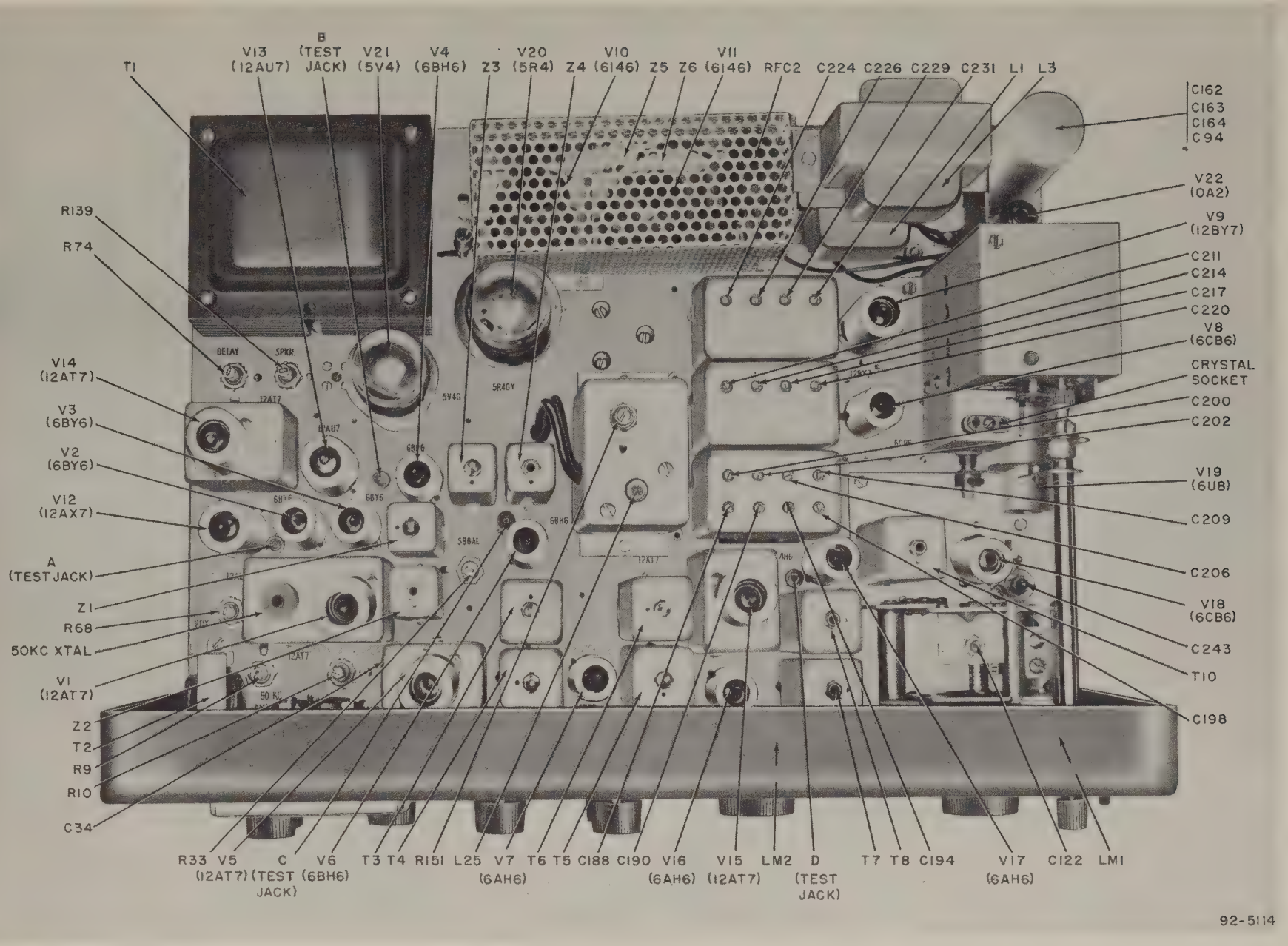


Figure 5. Model HT-30 Chassis, Top View

CRYSTAL FREQUENCY TABLE

Crystal Frequency (mc)	RESULTANT OPERATING FREQUENCY (mc)			
	80 Meters	40 Meters	20 Meters	10 Meters
5.225	3.500	6.9950*	13.920*	27.835*
5.3	3.575	7.025	13.995	28.135
5.4	3.675	7.125	14.095	28.535
5.5	3.775	7.225	14.195	28.935
5.6	3.875	7.325	14.295	29.335
5.725	4.000	7.450*	14.420*	29.835*

4-10. USE OF VOX AND DELAY CONTROLS

The VOX and DELAY controls are potentiometers located on the top of the transmitter-exciter chassis as illustrated in Fig. 5. Both controls are utilized in conjunction with VOX operation and are semi-permanently adjusted to your personal speaking characteristics.

A. The VOX control (R68) is an audio sensitivity control which determines the audio level which will trip (energize) the VOX RELAY placing the transmitter-exciter "on the air". This control should be adjusted with the microphone at the normal speaking distance from the mouth. Advance the VOX control to a setting slightly above that which will "trip" the VOX RELAY. Increasing the setting will increase the sensitivity and will have the undesirable result of background noise "tripping" the VOX RELAY and placing the transmitter-exciter on the air.

B. The DELAY control (R74) is in the grid circuit of the relay tube and determines the time lag in the de-energizing of the VOX RELAY when audio excitation is removed from the audio amplifier and VOX amplifier stages. This control should be advanced while speaking into the microphone and set at a position in which the time lapse between words will not de-energize the VOX RELAY. This adjustment will eliminate the constant keying of the transmitter-exciter at the beginning of each word when speaking. There is a slight interaction between the VOX and DELAY circuits, consequently, a slight readjustment of both controls may be necessary to obtain desired results.

4-11. USE OF SPEAKER CONTROL

This control is a potentiometer (R139) located on top of the transmitter-exciter chassis (Fig. 5) and is used in conjunction with VOX operation. When the station receiver and speaker are connected to the terminal board for VOX operation (paragraph 2-4B), the SPEAKER anti-trip control is advanced to a setting where the normal incoming audio signal will not energize the VOX RELAY. This feature prevents the retransmitting of the incoming audio signals from your station receiver.

4-12. MODEL HT-30 WITH LINEAR AMPLIFIER

When the Model HT-30 transmitter-exciter is used in conjunction with a linear amplifier, such as the Hallicrafters HT-31, it is desirable to use a swamping resistor across the rf transmission line between the two units. This resistor should have a value of 100 ohms, 9 watts (minimum) and be a non-inductive type, such as a globar type CX. There are two reasons for the use of this resistor.

1. The instantaneous input impedance of a class B stage changes as the driving voltage goes through a cycle. This change in impedance represents a change in load for the transmitter-exciter, which causes distortion during peaks when the load impedance is lowest. Adding a constant load impedance in parallel with the exciter output reduces the dynamic load change.
2. The signal to noise ratio (ratio of residual noise to maximum power output) in SSB operation is based on the maximum transmitter-exciter output capabilities. When the amount of transmitter-exciter output utilized is less than maximum, this ratio becomes less favorable since the maximum power output is decreased while the residual noise output remains the same.

IMPORTANT: Do not use less than 100 ohms resistance to swamp the exciter output. Too low a resistance value will result in distortion and a reduced amount of reserve power available.

4-13. SERVICE OR OPERATING QUESTIONS

For any further information regarding operation or servicing of your Model HT-30 transmitter-exciter, write to:

General Service Manager
The Hallicrafters Co.
4401 West Fifth Ave.
Chicago 24, Illinois

Be sure to include the model, serial, mark number, and date purchased.

Make no service shipments to the factory unless instructed to do so by letter. The Hallicrafters Company will not accept the responsibility for unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



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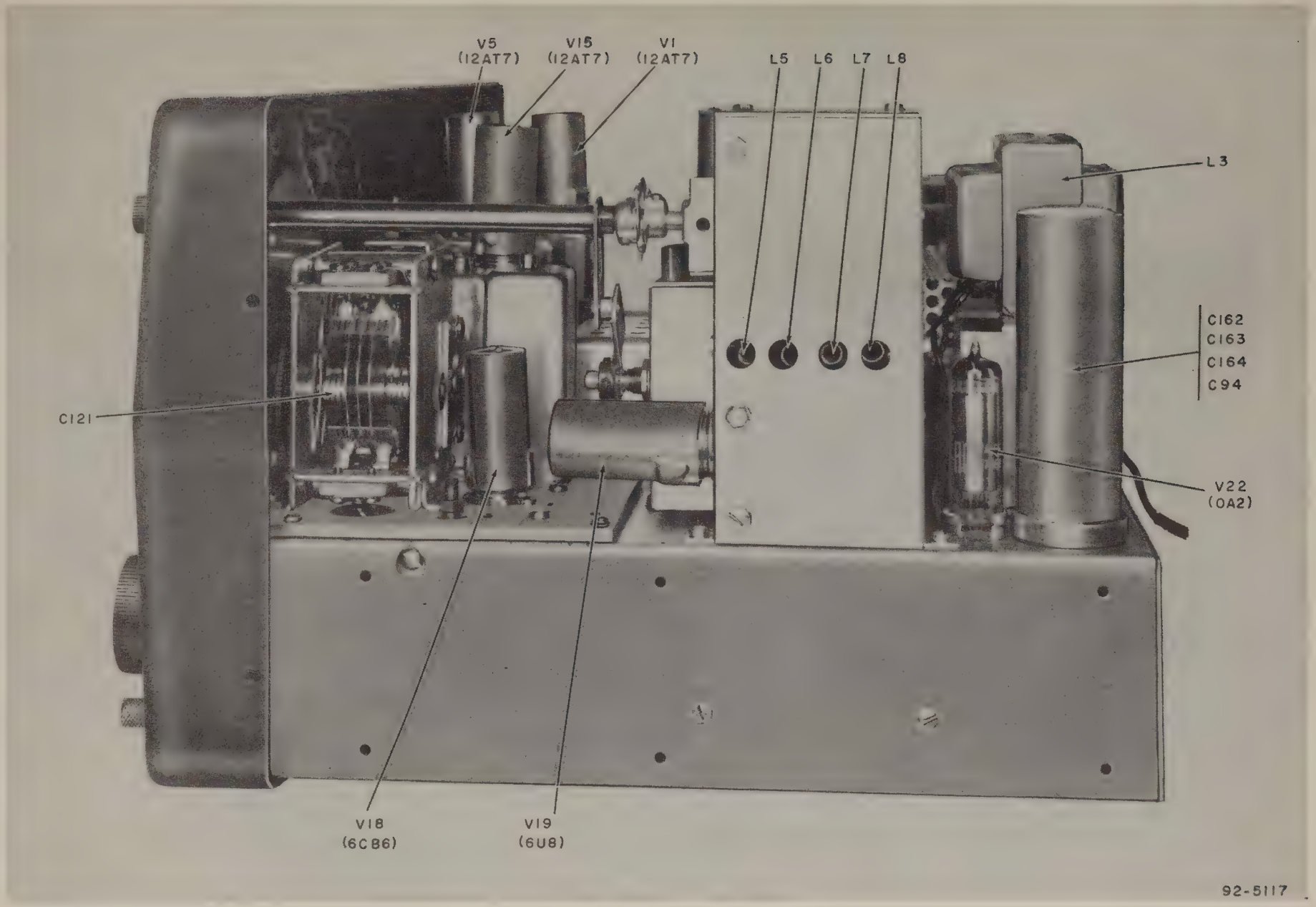


Figure 6. Model HT-30 Chassis, Right Side

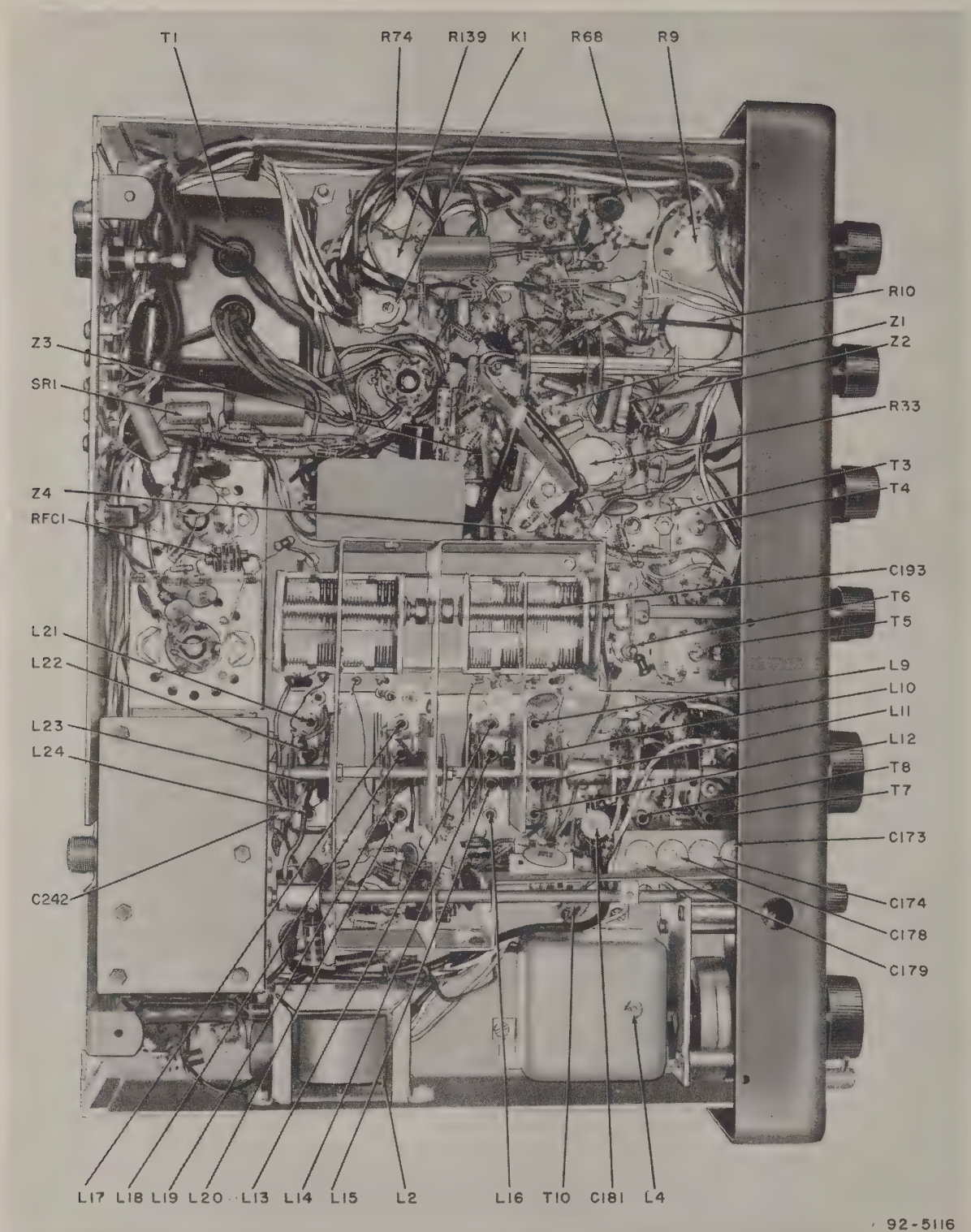


Figure 7. Model HT-30 Chassis, Bottom View

SECTION V
SERVICE DATA

5-1. TECHNICAL SPECIFICATIONS

TUBES..... 19 plus 1 voltage regulator and 2 voltage rectifiers
POWER SOURCE..... 105-125 volts, 50/60 cycles
POWER OUTPUT
SSB (PEP).....35 watts
CW .....35 watts
AM .....9 watts
AUDIO INPUT ..... 55 db minimum
STABILITY.....00.009 percent
HUM AND NOISE OUTPUT .... At least 40 db below carrier
UNWANTED BEAT OUTPUT .. At least 40 db below carrier
FREQUENCY COVERAGE..... 80, 40, 20, and 10 meter bands
FREQUENCY SELECTION .. Self-contained VFO or crystal
DIMENSIONS.....9 x 18-3/8 x 12-7/8"
SHIPPING WEIGHT..... 51 lbs.

5-2. CHASSIS REMOVAL

The chassis and front panel assembly are removable as a unit from the cabinet by removing 2 screws at each side of the front panel and the 5 screws on the under side of the cabinet.

5-3. TUBE AND DIAL LAMP REPLACEMENT

Access to the dial lamps and all tubes may be obtained by raising the top cover of the cabinet.

5-4. BASIC OPERATING PRINCIPLES

The basic operating principles of the Model HT-30 transmitter-exciter is explained in the following subparagraphs. Fig. 8 is a block diagram of the transmitter-exciter and Fig. 12 is the schematic diagram. The complete system is first discussed for SSB operation and a brief description of CW and AM operation follows.

A. GENERAL OPERATION

Tube V1 is a 50 KC crystal controlled oscillator and a phase splitter. The output of V1B is two 50 KC signals, 180 degrees out of phase. This signal, plus the modulation signal from the audio phase splitter stage V13B, are fed to a balanced modulator stage, V2 and V3. The rf drive and audio inputs to the balanced modulator stage are in push-pull and the output is connected in push-pull. The proper phase and amplitude relation has been obtained by the factory set PHASE BAL. and AMP. BAL. controls.

In SSB operation, when the CARRIER INJECTION control is set at "0", the balanced modulator stage is placed in a balanced condition and carrier output is at least 40 db below peak envelope power. Advancing the CARRIER INJECTION control unbalances this stage and injects the 50 KC carrier into the system.

Under balanced conditions, the output of the balanced modulator stage V2 and V3 consists of the upper and lower sideband of 50 kc. A filter system, in the input and output circuits of the sideband filter amplifier stage, V4, suppresses the lower sideband of the modulated 50 kc signal. The upper sideband is fed to the 1725 kc mixer, V6, where it is combined with 1675 kc or 1775 kc, as selected, from V5. The frequency used determines whether the upper or lower sideband is employed. For example:

1. Upper sideband - The upper sideband of 50 kc is mixed (sum) with 1675 kc to obtain the upper sideband of 1725 kc. The output circuit of the 1725 kc mixer stage, V6, consists of a coupled pair of tuned transformers, T3 and T4, which pass only a band of frequencies near 1725 kc.

2. Lower sideband - The upper sideband of 50 kc is mixed with 1775 kc to obtain the lower sideband of 1725 kc. As in the upper sideband condition, the output circuit of V6 passes only the frequencies near 1725 kc.

Up to this stage, the operation of the HT-30 transmitter-exciter is identical on all bands. The remaining stages "beat" (sum or difference) the selected 1725 kc sideband to the desired operating frequency. The "beating" of a sideband with progressively higher frequencies to obtain a desired operating frequency reduces "image" frequency problems. Frequency multiplication cannot be used since doubling the frequency would double the spacing of the sidebands. This would change the relative frequency of the modulating frequencies when the signal is detected.

B. 80 METER OPERATION

The selected sideband (upper or lower) of 1725 kc is amplified by 1725 kc amplifier, V7, and mixed (difference) by V17 with the output frequency of the VFO. Since the VFO output frequency is selectable from 5.225 to 5.725 mc, the difference output of the mixer is the sideband of a frequency between 3.500 to 4.000 mc.

C. 40 METER OPERATION

Operation on 40 meters is essentially the same as 80 meters except that "sum" mixing is employed in place of "difference" mixing. When the VFO output (5.225 to 5.725 mc) is mixed with the selected (upper or lower) sideband of 1725 kc, the resulting signal is the sideband of a frequency between 6.950 mc to 7.450 mc.

D. 20 METER OPERATION

For 20 meter operation, the selected sideband (upper or lower) of 1725 kc is mixed (difference) by V16 with the output of V15B, a 10.420 mc crystal oscillator. The output of V16, a sideband of 8.695 mc, is mixed (sum) again in V17 with the VFO output (5.225 to 5.725 mc). The output of V17 is the selected sideband of a frequency between 13.920 mc to 14.420 mc.

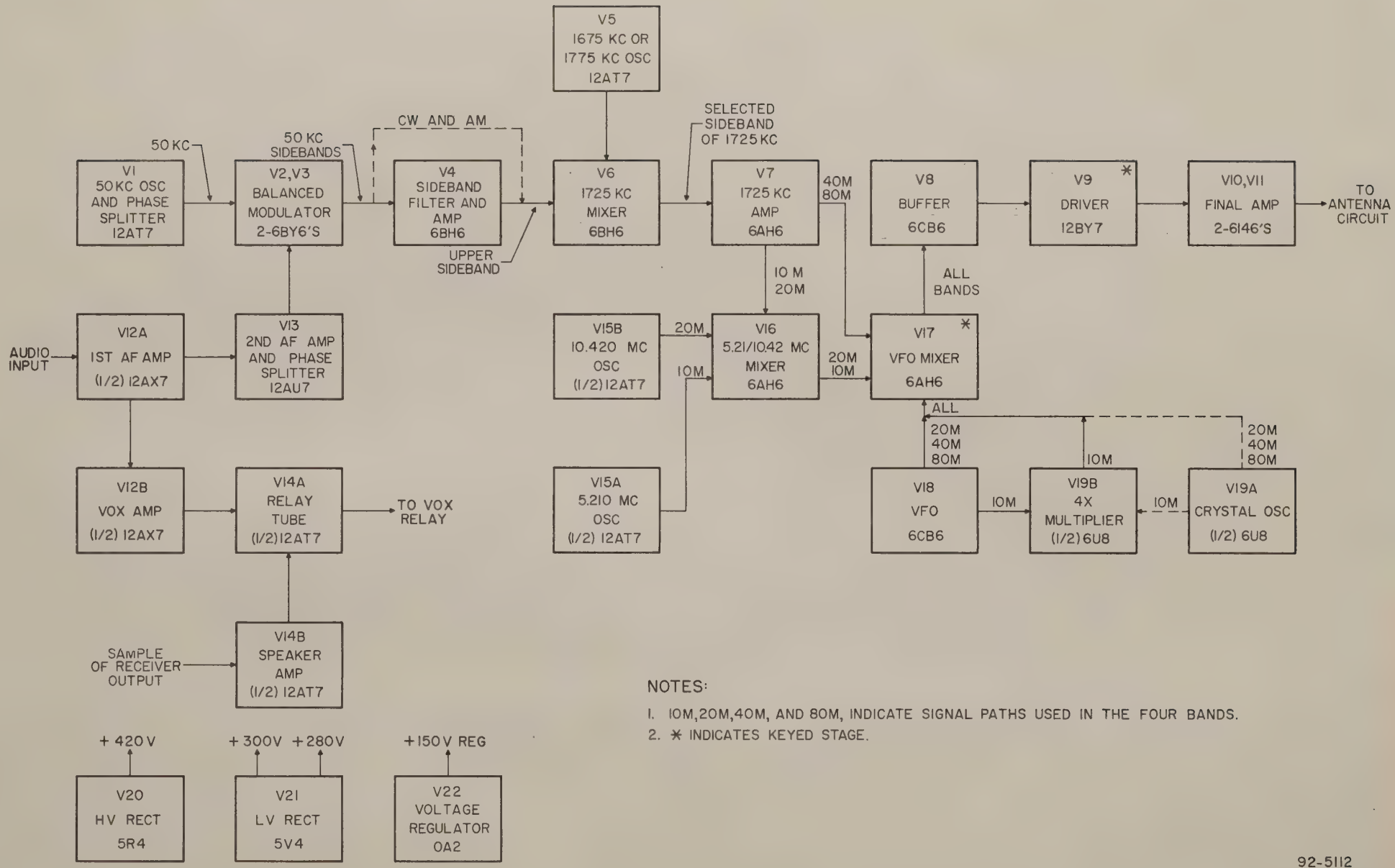


Figure 8. Model HT-30, Block Diagram

E. 10 METER OPERATION

The selected sideband (upper or lower) of 1725 kc is mixed (sum) by V16 with the output of V15A, a 5.210 mc crystal oscillator. The output of V16, a sideband of 6.935 mc, is mixed (sum) by V17 with the output of quadrupler V19B. The quadrupler multiplies the VFO frequency four times (20.900 mc to 22.900 mc). The result of the mixing action is a sideband of a frequency from 27.835 mc to 29.835 mc.

F. CW OPERATION

Advancing the CARRIER INJECTION control unbalances the balanced modulator stage (V2 and V3), allowing a carrier to be amplified and heterodyned to the desired output frequency. A section of the FUNCTION switch bypasses the 50 kc filter (V4 and associated circuitry) in the "CW" position. With these exceptions, CW operation is the same as SSB operation.

G. DSB (AM) OPERATION

As in CW operation, the carrier frequency is present in the signal and the 50 KC filter is bypassed. Amplitude modulation of the carrier occurs in the balanced modulator (V2 and V3). The resulting signal is amplified and heterodyned as in CW and SSB operation.

5-5. FUNCTION SWITCH

The position of the FUNCTION switch determines the type of transmission (CW, DSB, UPPER or LOWER SIDEBAND). Fig. 9 is a schematic diagram of the FUNCTION switch showing it in the "CW" position. The sections are marked "FS", followed by the wafer number and a letter designating front or rear as viewed from the front of the chassis. For example FS1R indicates; FUNCTION switch, first wafer, rear. FUNCTION switch operation is briefly explained in the following paragraphs.

A. CW OPERATION

The 50 kc carrier from the balanced modulator is routed around the 50 kc carrier and sideband filter to the 1725 kc mixer stage by FS3R. Section FS2F of the "FUNCTION" switch shorts the input of the sideband filter, since the passband characteristic of the filter would attenuate the carrier. The left-hand portion of FS1R and FS1F are open, removing plate voltage from the sideband filter amplifier, V4, and removing the keying line from the VOX relay. The right-hand portion of these switch sections have no effect in CW operation since the 1675 kc oscillator and 1775 kc oscillator produce the same carrier frequency.

B. DSB (AM) OPERATION

Rotating the FUNCTION switch one position clockwise, to "DSB", does not alter any connections in FS3R, FS2R, and FS1R. The only change that occurs are in FS1F, where the keying line is connected to the VOX relay.

C. SSB OPERATION

Rotating the switch to the third and fourth position, section FS3R connects the output of the sideband filter amplifier stage, V4, to the succeeding stages. FS2F opens the short across part of the sideband filter and removes the 82K swamping resistor from the remainder of the filter. The left hand sections of FS1R applies voltage to the plate of V4, and FS1F still connects the keying line to the VOX relay.

The right-hand portions of FS1R and FS1F select the 1675 kc or 1775 kc oscillator to obtain the upper or lower sideband as selected by the operator. For frequency selection on the four bands, sum or difference mixing is employed. Difference mixing reverses the position of the sideband. For example, in 80 meter operation, the lower sideband of 1725 KC is mixed (difference) with the VFO frequency; the resultant signal is on upper sideband. Therefore, a section of the BAND SELECTOR switch applies cut-off bias to either FS1R or FS1F of the FUNCTION switch. When a particular sideband is selected by the operator, the BAND SELECTOR switch automatically selects the correct local oscillator frequency (1675 kc or 1775 kc) as required, to compensate for the change between sum and difference mixing on each band.

5-6. VOLTAGE MEASUREMENT

Tube socket voltages for the transmitter-exciter are shown in Fig. 10 and Fig. 11. Voltage readings for the 50 kc oscillator (V1), 1675/1775 kc oscillator (V5), vox amplifier and relay tube (V14), 5.21/10.42 mc oscillator (V15), vfo (V18), and the crystal oscillator and 4X multiplier (V19) must be taken from the top of the chassis as they are unattainable from the underside. Access to pin voltages are easily obtained by utilizing commercially available tube adapters. The adapters have external test prod points and are simply inserted between the tube and socket.

It is possible to also obtain pin voltages by removing the tube and winding one or two turns (insulation removed at turns) of #20 solid wire around the pin in question and reinserting the tube in its socket. However, if this procedure is utilized, care should be exercised to prevent inadvertent shorting of the tube pin to chassis or to the adjacent tube pin.

Specific conditions, under which voltage measurement is made, are noted on each voltage chart.

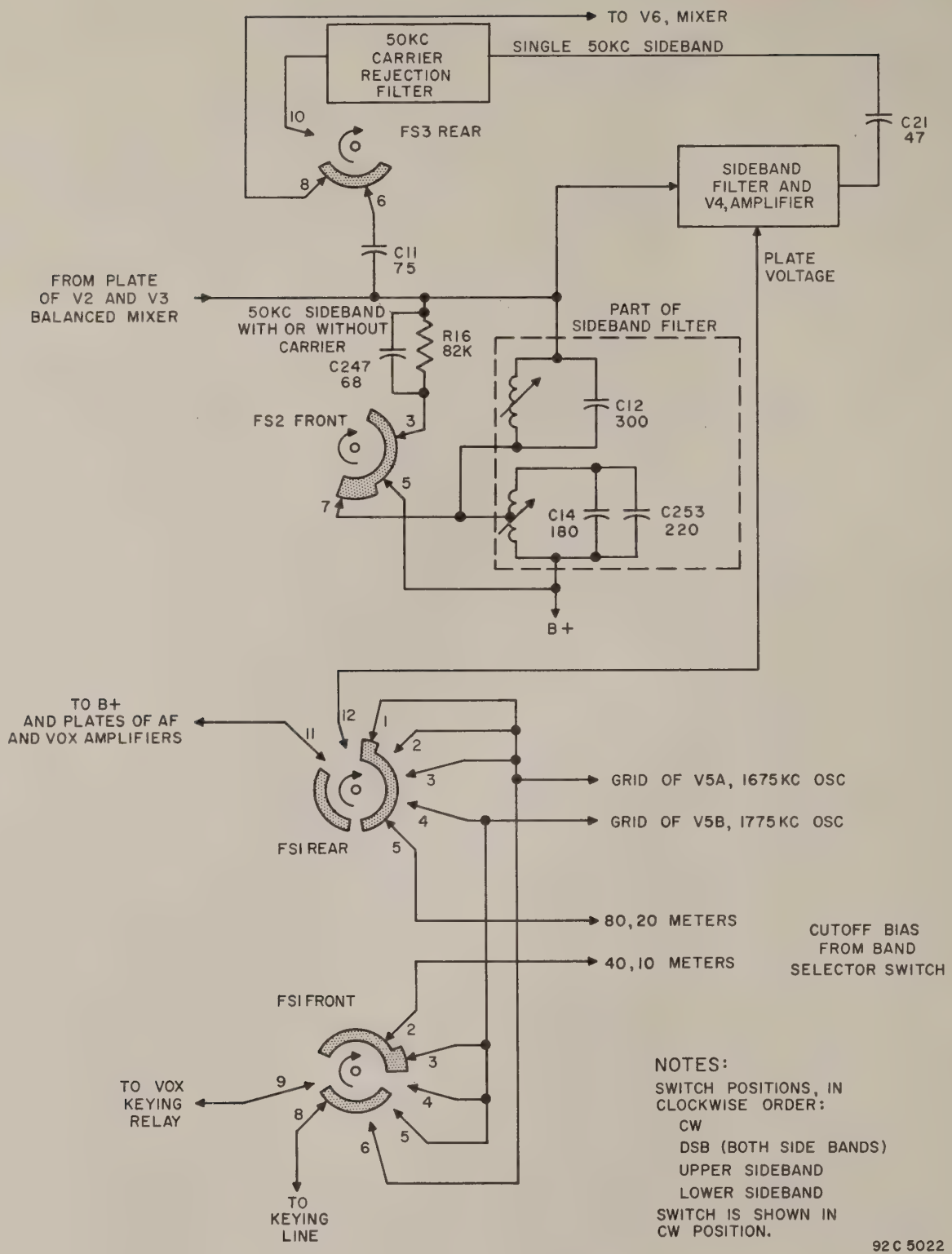
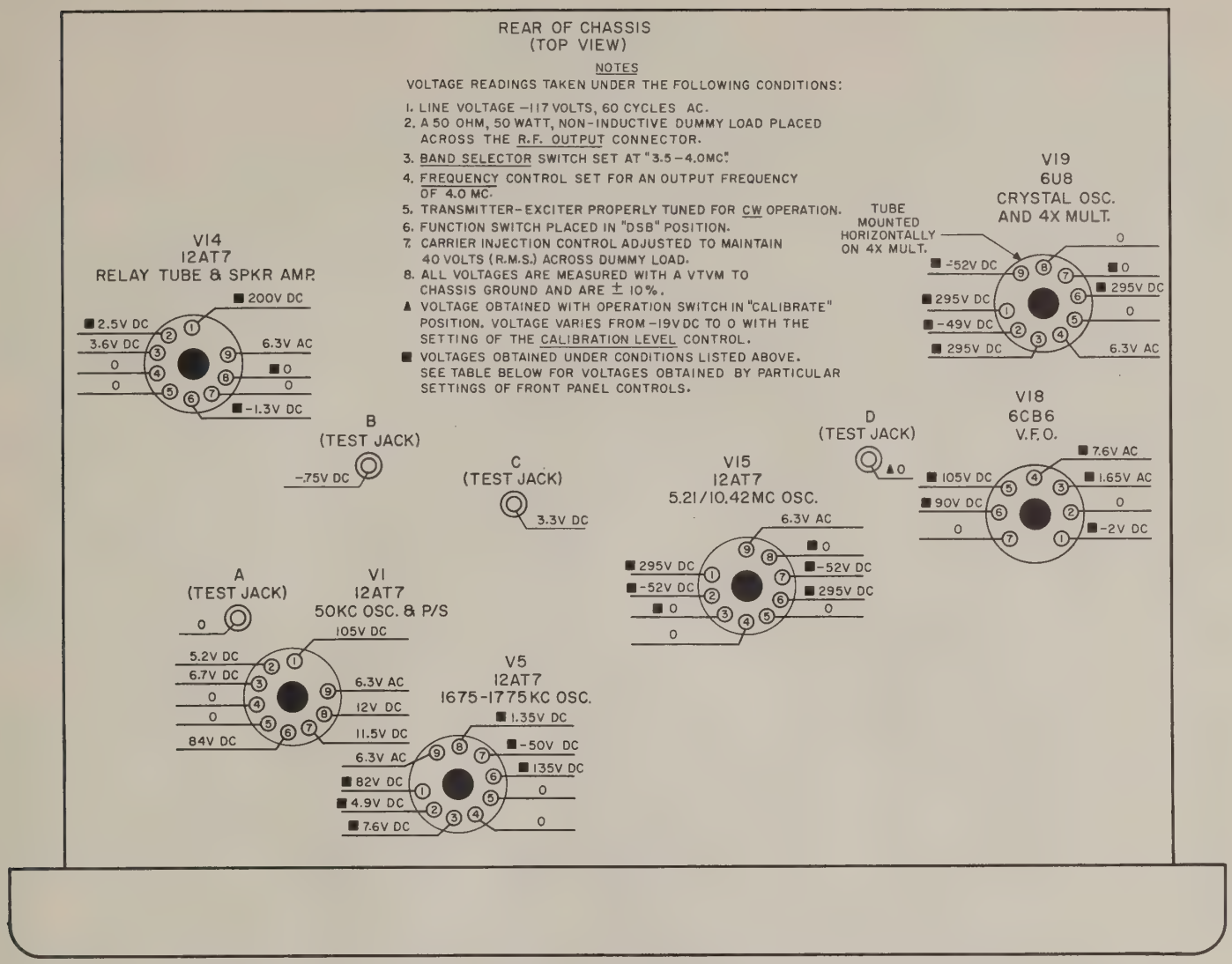


Figure 9. Function Switch, Simplified Diagram

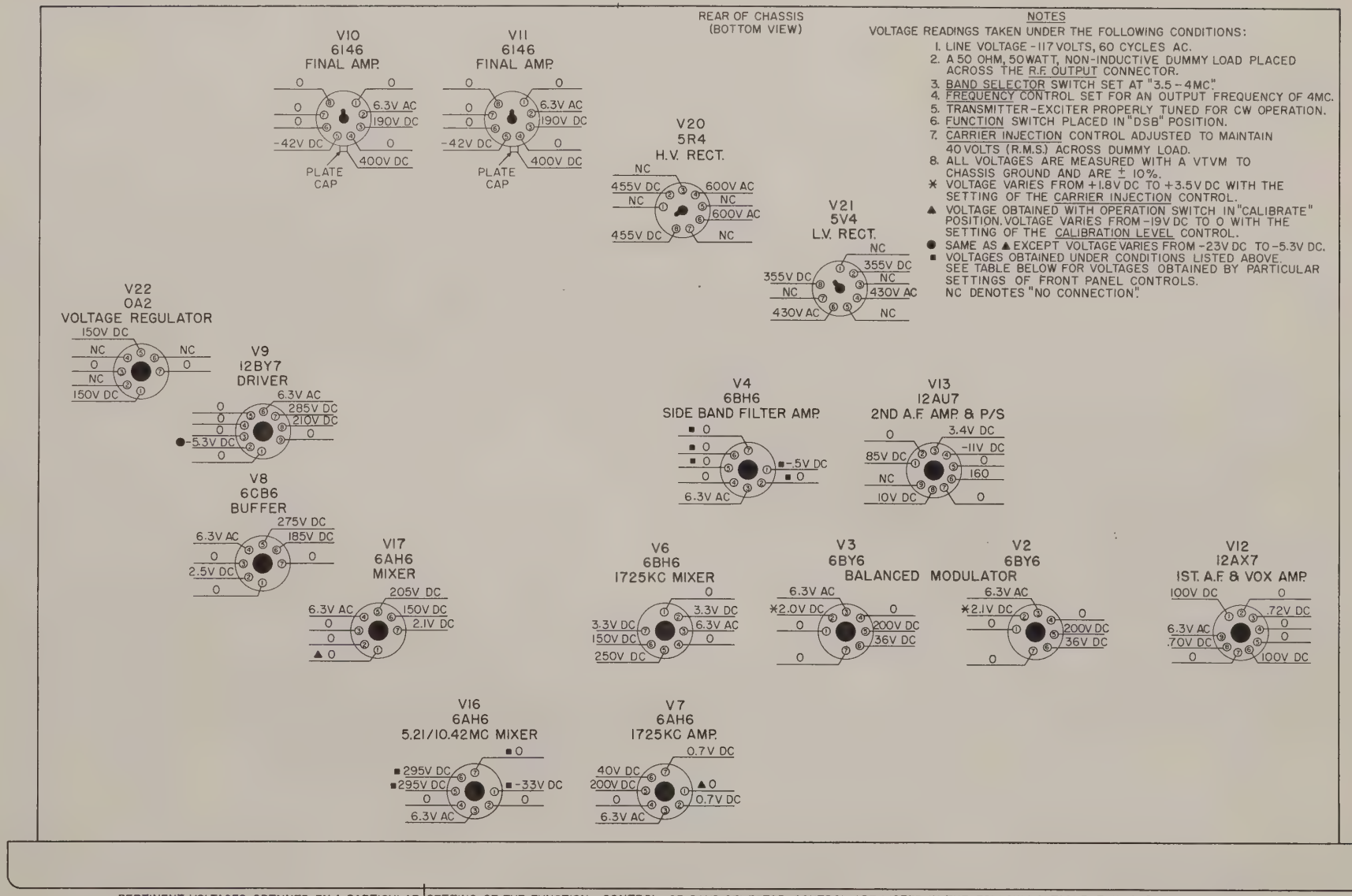


PERTINENT VOLTAGES, OBTAINED BY A PARTICULAR SETTING OF THE FUNCTION, BAND SELECTOR, OR XTAL-VFO CONTROL, ARE LISTED IN THE FOLLOWING TABLE. THE UNIT MUST BE RETUNED FOR THE HIGH END OF EACH BAND WHEN TAKING VOLTAGE MEASUREMENTS ON THE 40, 20, OR 10 METER BAND AS INSTRUCTED IN THE TABLE. ALSO, THE CARRIER INJECTION CONTROL IS ADJUSTED TO MAINTAIN 30 VOLTS (RMS) ACROSS THE DUMMY LOAD WHEN ON THE 10 METER BAND. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.

TUBE	CONTROL AND SETTING	TUBE PIN NUMBER								
		1	2	3	4	5	6	7	8	9
V5-12AT7	FUNCTION-LOWER SIDEBAND	90	-48.0	1.48			83.0	7.■	9.0	
V14-12AT7	OPERATION-CALIBRATE	0	2.5	3.4			-1.4		0	
	OPERATION-VOX	275	2.5	8.0			180		4.0	
V15-12AT7	BAND SELECTOR 14-14.35	290	-52	5.8			97.0	4.7	9.7	
	BAND SELECTOR 28-29.7	105	-2.4	8.5			290	-52	5.2	
V18-6CB6	XTAL VFO XTAL (CRYSTAL REMOVED)	-33.0		0	0	150	150			
V19-6U8	BAND SELECTOR 28-29.7	290	-3.1	175			295	.59		-52.0

92-5119

Figure 10. Tube Socket Voltage Chart, Top of Chassis



PERTINENT VOLTAGES, OBTAINED BY A PARTICULAR SETTING OF THE FUNCTION CONTROL OR BAND SELECTOR CONTROL ARE LISTED IN THE FOLLOWING TABLE. THE UNIT MUST BE RETUNED FOR THE HIGH END OF THE 40 OR 10 METER BAND WHEN TAKING VOLTAGE MEASUREMENTS AS INSTRUCTED IN THE TABLE. ALSO, THE CARRIER INJECTION CONTROL IS ADJUSTED TO MAINTAIN 30 VOLTS (RMS) ACROSS THE DUMMY LOAD WHEN ON THE 10 METER BAND. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.

TUBE	CONTROL AND SETTING	TUBE PIN NUMBER								
		1	2	3	4	5	6	7	8	9
V4-6BH6	FUNCTION-UPPER SIDEBAND	0	2.2			240	100	2.2		
V16-6AH6	BAND SELECTOR 14-14.35	0				290	195	3.1		
	BAND SELECTOR 28-29.7	0				290	195	3.4		

92-5118

Figure 11. Tube Socket Voltage Chart, Bottom of Chassis

SECTION VI
ALIGNMENT

The Model HT-30 Transmitter-exciter has been carefully aligned at the factory by specially trained technical personnel using precision equipment. Alignment of the transmitter-exciter should not be attempted until all other possible causes of faulty operation have been investigated. Alignment should not be required unless the transmitter-exciter has been tampered with or component parts have been replaced. Alignment should not be attempted unless the servicing personnel is thoroughly familiar with communications equipment and experienced in their alignment. Refer to Figs. 5, 6 and 7 for location of all alignment adjustments.

6-1. EQUIPMENT REQUIRED

1. R.F. Signal Generator - Standard Measurement Model-65B or equivalent having an output impedance of 70 ohms or less. (A .01 mfd dc blocking capacitor must be placed in series with the rf lead.)

2. Vacuum tube voltmeter (VTVM) - Hewlett Packard 410A or equivalent having an rf probe.

3. Dummy load - 50 ohms non-inductive rated at 50 watts. The dummy load may be a Globar resistor, carbon resistor, or Bird Wattmeter.

6-2. INITIAL CONTROL SETTINGS

POWER.....TRANSMIT
FUNCTION.....DSB
OPERATION .....MOX
DRIVER TUNING .....Fully clockwise (open gang)
FINAL TUNING.....Fully clockwise (open gang)
FREQUENCY.....Fully clockwise (open gang)
BAND SELECTOR .....As instructed
SPEECH LEVEL..... 0
CARRIER INJECTION 0
METER COMPRESSION 10
CALIBRATE LEVEL..... 0
4X TUNING .....Fully clockwise (open gang)
VFO-XTAL ..... XTAL (Crystal must be removed from socket)

6-3. IF ALIGNMENT PROCEDURE

Step	Signal Generator Connections	Signal Generator Frequency	Output Connections	Control Setting	Remarks
1725 KC IF ALIGNMENT					
1	High side directly to test jack "C". See Fig. 5. Common side to chassis.	1725 KC at .1 volt output. (unmod.)	VTVM rf probe to test jack "D". See Fig. 5. Common side to chassis.	BAND SELECTOR 3.5-4.0 MC position.	Remove osc. tubes V1, V5, from sockets. Peak upper and lower slugs of T3, T4, T5, and T6 for maximum deflection of VTVM and a symmetrical bandpass characteristic.
8695 KC (20 METER IF ALIGNMENT)					
2	High side to pin No. 1 of V16. Common side to chassis.	8695 KC at .1 volt output. (unmod.)	Same as STEP 1.	BAND SELECTOR 14-14.35 MC position.	Adjust the top and bottom slugs of T7 and T8 respectively for maximum deflection on VTVM.
6935 KC (10 METER IF ALIGNMENT)					
3	Same as STEP 2.	6935 KC at .1 volt output. (unmod.)	Same as STEP 1.	BAND SELECTOR 28-29.7 MC position.	Adjust trimmer capacitors C173, C174, C178, C179, (Fig. 7) for maximum deflection on VTVM. Replace V1, V5, V15 removed in STEP 1, after completion of all IF Alignments.

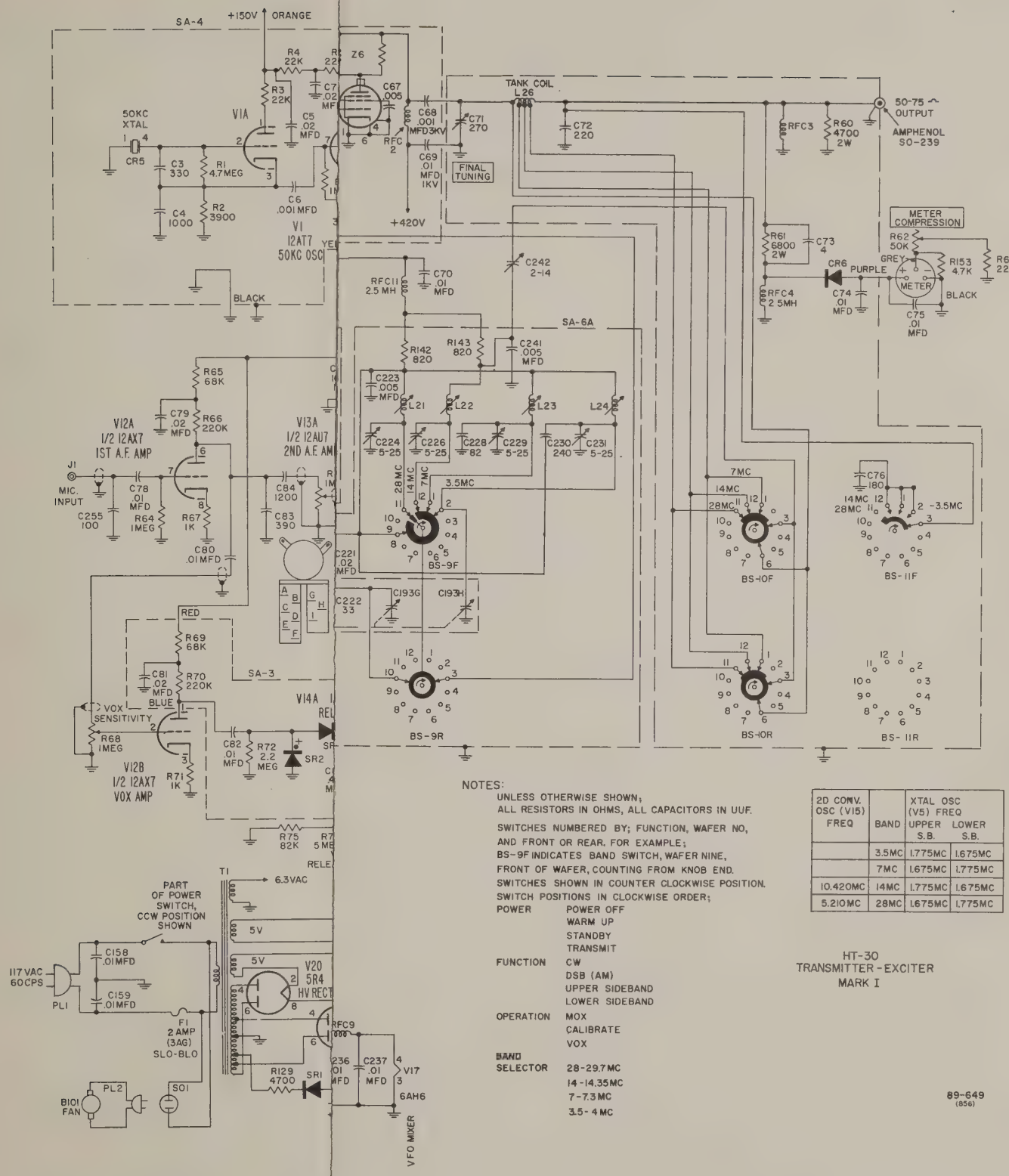
6-4. 4X MULTIPLIER ALIGNMENT

MINOR ALIGNMENT			
Step	VTVM Connections	Control Setting	Remarks
1	VTVM RF probe connected to test jack D. Fig. 5.	BAND SELECTOR..... 10 meter XTAL-VFO ..... VFO FREQUENCY.....See remarks 4X TUNING.....See remarks	Remove osc. tube V15. Set FREQUENCY control to 29.7 mc for "high end" tracking. Adjust 4X TUNING control for maximum deflection on VTVM.
Adjust trimmer capacitor C181 for maximum deflection. Set FREQUENCY control to 28.0 mc for "low end" tracking. Tune 4X TUNING control for maximum deflection on VTVM. Adjust slugs of L5, L6, L7, and L8 for maximum meter deflection. Repeat entire procedure until trimmer and coil adjustments result in no appreciable increase in meter deflection. The 4X multiplier stage is then correctly tracking with maximum output.			
MAJOR ALIGNMENT			
2	The following alignment should not be required unless a major component (L5, L6, etc.) has been replaced or tampered with in the 4X multiplier stage. If a major alignment is required, proceed as follows: Set the FREQUENCY control to 28.0 mc for "low end" tracking. Place the VTVM RF probe on the stator side of C151 and adjust the 4X TUNING control for maximum deflection on the VTVM. Next, peak L5 and L6 for maximum output. Place the RF probe on the plate side of C154. Peak L7 and "touch up" L5 and L6. Place the VTVM RF probe on the plate side of C157. Adjust for maximum output by peaking L8 and re-adjusting L5, L6, and L7. With this adjustment completed, perform the minor alignment as instructed above (Step 1).		

6-5. RF ALIGNMENT

IMPORTANT - The rf alignment of any band should only be attemped when a transmitter-exciter malfunction has been analyzed and definitely traced to rf mis-alignment.

Step	Band	Signal Generator Connections	Output Connections	Trimmers Adjust. for Max.	Coils Adj. for Max.	Sig. Generator Freq. (megacycles)			
						f1	f2	f3	f4
1	80	High side to test jack "D". Common to chassis. (Any extension on generator leads must be kept to absolute minimum to prevent parasitic oscillations.) See Figs. 5 and 7.	Dummy load and VTVM connected to R.F. OUTPUT.	C198 C209 C220 C231	L12 L16 L20 L24	4.2	3.4	4.0	3.5
2	40	"	"	C194 C206 C217 C229	L11 L15 L19 L23	7.4	6.95	7.3	7.0
3	20	"	"	C190 C202 C214 C226	L10 L14 L18 L22	14.7	13.5	14.35	14.0
4	10	"	"	C188 C200 C211 C224	L9 L13 L17 L21	30.0	27.4	29.7	28.0



NOTES:

UNLESS OTHERWISE SHOWN;
ALL RESISTORS IN OHMS, ALL CAPACITORS IN UUF.

SWITCHES NUMBERED BY; FUNCTION, WAFER NO, AND FRONT OR REAR. FOR EXAMPLE; BS-9F INDICATES BAND SWITCH, WAFER NINE, FRONT OF WAFER, COUNTING FROM KNOB END.
SWITCHES SHOWN IN COUNTER CLOCKWISE POSITION.
SWITCH POSITIONS IN CLOCKWISE ORDER;

POWER	POWER OFF
	WARM UP
	STANDBY
	TRANSMIT
FUNCTION	CW
	DSB (AM)
	UPPER SIDEBAND
	LOWER SIDEBAND
OPERATION	MOX
	CALIBRATE
	VOX
BAND SELECTOR	28-29.7MC
	14-14.35MC
	7-7.3MC
	3.5-4MC

2D CONV. OSC (V15) FREQ	BAND	XTAL OSC (V5) FREQ UPPER S.B.	XTAL OSC (V5) FREQ LOWER S.B.
	3.5MC	1.775MC	1.675MC
	7MC	1.675MC	1.775MC
10.420MC	14MC	1.775MC	1.675MC
5.210MC	28MC	1.675MC	1.775MC

HT-30
TRANSMITTER-EXCITER
MARK I

89-649
(856)

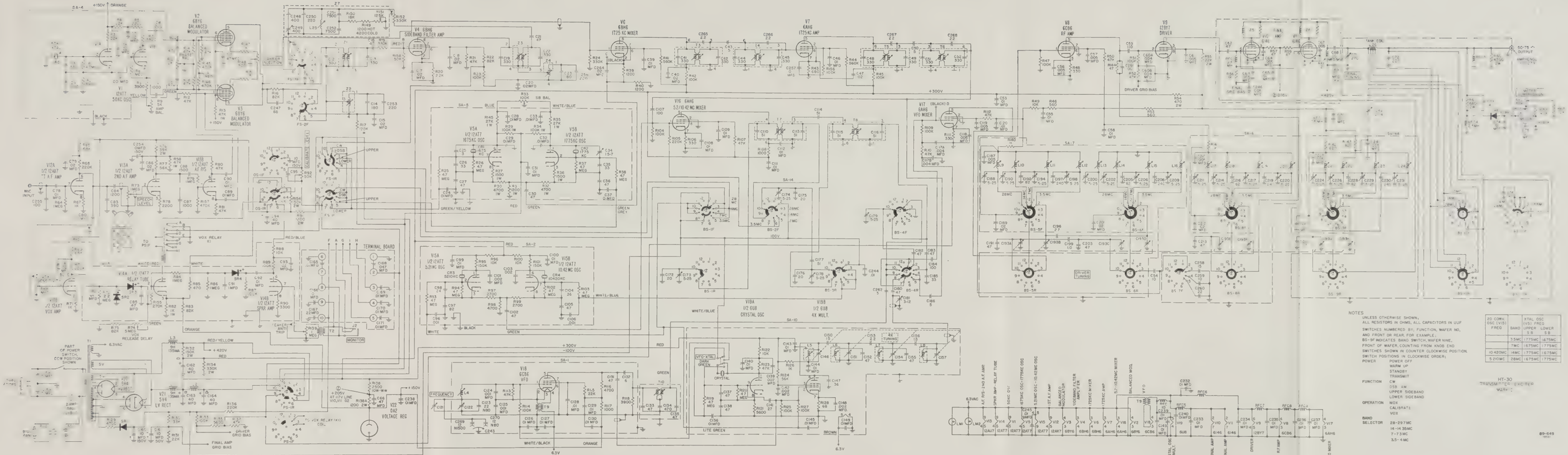
6-4. 4X MULTIPLIER ALIGNMENT

MINOR ALIGNMENT			
Step	VTVM Connections	Control Setting	Remarks
1	VTVM RF probe connected to test jack D. Fig. 5.	BAND SELECTOR..... 10 meter XTAL-VFO ..... VFO FREQUENCY .....See remarks 4X TUNING.....See remarks	Remove osc. tube V15. Set FREQUENCY control to 29.7 mc for "high end" tracking. Adjust 4X TUNING control for maximum deflection on VTVM.
Adjust trimmer capacitor C181 for maximum deflection. Set FREQUENCY control to 28.0 mc for "low end" tracking. Tune 4X TUNING control for maximum deflection on VTVM. Adjust slugs of L5, L6, L7, and L8 for maximum meter deflection. Repeat entire procedure until trimmer and coil adjustments result in no appreciable increase in meter deflection. The 4X multiplier stage is then correctly tracking with maximum output.			
MAJOR ALIGNMENT			
2	The following alignment should not be required unless a major component (L5, L6, etc.) has been replaced or tampered with in the 4X multiplier stage. If a major alignment is required, proceed as follows: Set the FREQUENCY control to 28.0 mc for "low end" tracking. Place the VTVM RF probe on the stator side of C151 and adjust the 4X TUNING control for maximum deflection on the VTVM. Next, peak L5 and L6 for maximum output. Place the RF probe on the plate side of C154. Peak L7 and "touch up" L5 and L6. Place the VTVM RF probe on the plate side of C157. Adjust for maximum output by peaking L8 and re-adjusting L5, L6, and L7. With this adjustment completed, perform the minor alignment as instructed above (Step 1).		

6-5. RF ALIGNMENT

IMPORTANT - The rf alignment of any band should only be attemped when a transmitter-exciter malfunction has been analyzed and definitely traced to rf mis-alignment.

Step	Band	Signal Generator Connections	Output Connections	Trimmers Adjust. for Max.	Coils Adj. for Max.	Sig. Generator Freq. (megacycles)			
						f1	f2	f3	f4
1	80	High side to test jack "D". Common to chassis. (Any extension on generator leads must be kept to absolute minimum to prevent parasitic oscillations.) See Figs. 5 and 7.	Dummy load and VTVM connected to R.F. OUTPUT.	C198 C209 C220 C231	L12 L16 L20 L24	4.2	3.4	4.0	3.5
2	40	"	"	C194 C206 C217 C229	L11 L15 L19 L23	7.4	6.95	7.3	7.0
3	20	"	"	C190 C202 C214 C226	L10 L14 L18 L22	14.7	13.5	14.35	14.0
4	10	"	"	C188 C200 C211 C224	L9 L13 L17 L21	30.0	27.4	29.7	28.0


V2 6BY6 BALANCED MODULATOR
V3 6BY6 BALANCED MODULATOR
V4 6BH6 SIDEBAND FILTER AMP
V5A 1/2 12AT7 1675KC OSC
V5B 1/2 12AT7 1775KC OSC
V6 6BH6 1725 KC MIXER
V7 6AH6 1725KC AMP
V8 6CB6 RF AMP
V9 12BY7 DRIVER
V10 6CB6 FINAL AMP
V11 6146 FINAL AMP
V12A 1/2 12AX7 1ST A.F. AMP
V12B 1/2 12AX7 2ND A.F. AMP
V13A 1/2 12AX7 2ND A.F. AMP
V13B 1/2 12AT7 A.F. PS
V14 1/2 12AT7 RELAY TUBE
V15 1/2 12AT7 SPKR AMP
V16 6AH6 52/10.42 MC MIXER
V17 6AH6 VFO MIXER
V18 6C6B VFO
V19A 1/2 6U8 CRYSTAL OSC
V19B 1/2 6U8 4X MULT.
V21 5V4 LV RECT
V22 0A2 VOLTAGE REG
VOX RELAY
TERMINAL BOARD
PART OF POWER SWITCH, CCW POSITION SHOWN
FINAL AMP GRID BIAS
DRIVER GRID BIAS
DRIVER TUNING
TANK COIL
TANK AMP
RELEASE DELAY
ANTI TRIP
SIDETONE LEVEL
CALIBRATE
MONITOR
MIC INPUT
TO PTT
BAND SELECTOR
VFO-XTAL
CRYSTAL
LITE GREEN
BROWN
WHITE/BLACK
WHITE/BLUE
RED/BLUE
RED/YELLOW
GREEN/YELLOW
GREEN/GREY
ORANGE
BLACK
RED
GREEN
YELLOW
BLUE
WHITE
GREY
+300V
+150V
+420V
-100V
6.3VAC
6.3V
5V
50-75 Ω OUTPUT
ANTENNA
SA-1
SA-2
SA-3
SA-4
SA-5
SA-6
SA-7
SA-8
SA-9
SA-10
SA-11
SA-12
SA-13
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SA-40

SERVICE PARTS LIST (Cont)

Schematic Symbol	Description	Hallicrafters Part Number

TRANSFORMERS AND COILS (cont)

L-11, 15, 19, 23		
	Coil, RF (7.0-7.3 MC)	51B2017
L-12, 16, 20, 24		
	Coil, RF (3.5-4 MC)	51B2018
L-5, 6, 7, 8		
	Coil, (4 x mult)	51B2046
L-26	Coil, final tank	51B2106
L-1	Choke, filter (9 Hy 135 ma.)	56C205
L-2	Choke, filter (10 Hy 80 ma.)	56C213
L-3	Choke, filter (9 Hy 135 ma.)	56A248
T-3, 4, 5, 6		
	Transformer, coil 1725 KC	50B662
T-10	Transformer, (VFO bandpass filter)	50B679
T-7, 8	Transformer, IF 6935-8695 KC	50C685
T-1	Transformer, power	52C337
T-9	Choke, VFO output assembly	53B359
T-2	Transformer, audio input	55B261
Z-1, 3	Transformer, balance 50 KC	50B658
Z-2, 4	Transformer, 50 KC trap	50C699
Z-5, 6	Choke, parasitic	53B334
RFC-1, 4, 11		
	Choke, RF 2.5 MH	53B335
RFC-2	Choke, RF (final plate)	53C340
RFC-5, 6, 7, 8, 9, 10		
	Choke, fil.	53B358
RFC-3	Choke, RF 0.3 MH	53A369

SWITCHES

BS	Switch, band	60B664
FS	Switch, function	60B668
PS	Switch, power off-on-standby	60B666
OS	Switch, voc-cal-manual	60B665
	Switch, VFO-Xtal	60 B745

TUBES

V-22	Electron, type OA2 voltage regulator	90X0A2
V-20	Electron, type 5R4GY high voltage rect.	90X5R4GY
V-21	Electron, type 5V4G low voltage rect.	90X5V4G
V-7	Electron, 6AH6, 1725 KC amp.	90X5V4G
V-16	Electron, 6AH6, 5.2/10.42 mc mixer	90X5V4G
V-17	Electron, 6AH6, VFO mixer	90X5V4G
V-4	Electron, type 6BH6, sideband filter amp	90X6BH6
V-6	Electron, type 6BH6, 1725 KC mixer	90X6BH6
V-2	Electron, type 6BY6, balanced mod	90X6BY6
V-3	Electron, type 6BY6, balanced mod	90X6BY6
V-8	Electron, type 6CB6, RF amp.	90X6CB6
V-18	Electron, type 6CB6, VF)	90X6CB6
V-19	Electron, type 6U8, crystal Osc/4 X mult.	90X6U8
V-1	Type 12AT7, 50 KC osc	90X12AT7
V-5	Type 12AT7, 1675 KC/1775 KC osc	90X12AT7
V-14	Type 12AT7, relay tube/Spkr. amp	90X12AT7
V-15	Type 12AT7, 5.21 MC/10.42 MC osc	90X12AT7
V-12	Tube, type 12AX7, 1st AF amp/vox amp	90X12AX7
V-13	Type 12AU7, 2nd AF amp/AF P/S	90X12AU7
V-9	Type 12BY7, driver	90X12BY7
V-10	Type 6146, final amp	90X6146
V-11	Type 6146, final amp	90X6146

RECTIFIERS AND CRYSTALS

SR-2, 3, 4		
	Selenium diode	19B1908
CR-6	Diode	19A1916
CR-2	Crystal, 1775 KC	19-1903
CR-1	Crystal, 1675 KC	19-1904

RECTIFIERS AND CRYSTALS (cont)

CR-3	Xtal, 5210 KC	19-1905
CR-4	Xtal, 10420 KC	19-1906
CR-5	Crystal, 50KC	19B1946
SR-1	Selenium rectifier	27B224

MISCELLANEOUS

	Arm link	18A125
	Arm link	63B2105
	Base, sub chassis	70C1242
	Bracket, cap. mtg.	67B3507
	Bracket, cap. mtg.	67B3508
	Bracket, cap. mtg (tandem)	67C3460
	Bracket, carrier rej. filter	67A4185
	Bracket, chassis mtg.	67C797
	Bracket, choke mtg.	67D4149
	Bracket, coil mtg. (front mult).	67B3099
	Bracket, coil mtg. (rear mult).	67B3098
	Bracket, cover last mixer	67A3922
	Bracket, Gear adj.	67A3011
	Bracket, Gear drive & shield mtg.	67A3459
	Bracket, motor mtg.	67B4182
	Bracket, motor support	67B4183
	Bracket, mtg. (coil assy)	67A3458
	Bracket, mtg. (mult cond)	67B3457
	Bracket, mtg. (stop arm)	67B3162
	Bracket, mtg. trimmer	67B3456
	Bracket & shaft assy. (idler gear)	67B3113
	Bracket, shield mtg. & drive gear	67A3011
	Bracket, trimmer mtg.	67A3922
	Bushing, dial	77B1038
	Bushing, (friction brake)	77A1037
	Bushing, (final tank)	77A1044
	Cabinet, detail	66E1081
	Channel, rubber	16A180
	Chassis, base	70-1216
	Clamp, electric	76B1784
J-3	Connector	10A056
J-1	Connector, mike	29A043
	Coupler, flexible	29A051
	Coupler, flexible	29A294
	Coupler, solid	29A269
	Cover, cabinet top	66 E118
	Cover, final amp.	66C1284
	Cover, last mixer	66B1364
	Cover, shield (final tank)	66B1227
	Dial scale mtg.	83 C523
	Fan, blade	80 C305
	Flywheel	71A205
	Foot, rubber (black)	16A007
F-1	Fuse, 2 amp, 125 V., Slo-Blo	39A428
	Gear, idler assembly	26B283
	Grommet	16A034
	Grommet	16A180
	Holder, fuse	6A451
	Gear, pinion (shaft)	26B281
J-2	Jack, phone monitor	36A002
A, B	Jack, tip (black) test jack	36A083
C, D	Jack, tip (red) test jack	36 A084
	Knob - Speech Level	83B493
	Knob - Carrier Injection	83B493
	Knob - Meter Compression	83B493
	Knob - Calibrate Level	83B493
	Knob - Power, etc	83B497
	Knob - Function	83B498
	Knob - Operation	83B495
	Knob - Band Selector	83B496
	Knob - Driver Tuning	83B491
	Knob - Frequency	83B492
	Knob - Dial Drag	15B899
	Knob - 4 X Tuning, VFO, XTAL, Final Tuning	15B936
	Lever, brake (friction)	74B999
	Line cord	87A3644
PL-1	Line cord & plug	87B4833
	Lock, line cord	76A397-1
	Lock, line cord	76A397-2
	Meter, output level	82-292

MISCELLANEOUS (cont)

B-101	Motor	20B088
	Overlay, front panel	68C363
	Panel, front	68E340
LM-1, 2	Pilot lamp, type 47	39A004
	Pilot light assy.	86A219
	Pin, roll	74B1034
	Pin, roll (.062 x 3/8)	74A954
	Plate, cap w/leads	76-1579
	Plate, gear (1st)	63B1786
	Plate, gear (2nd)	63B1787
	Plate, gear (3rd)	63B1788
	Plate, var. cap. (VFO sub chassis	63C1811
	Post, latch	11A226
S-01	Receptacle, AC w/leads	10B921
K-1	Relay, voice control	21-197
	Retainer, glass	67A3629
	Rubber, spacer	16 A694
	Shaft, actuator	74C1078
	Shaft, bandswitch	74A1009
	Shaft, cond. (final tank)	74B1012
	Shaft, cond. (RF amp)	74B1011
	Shaft, friction brake	74B1000
	Shaft, (mult)	74B1010
	Shield, 50 KC amp	69B846
	Shield, base	69-842
	Shield, can	69-750
	Shield, can	69-751
	Shield, can	69B752
	Shield, can	69B839
	Shield, can (coil assy)	69A833
	Shield, can (coil assy)	69B825
	Shield, cap., 2nd RF	69C748
	Shield, cap., left RF	69C755
	Shield, cap., right RF	69C754
	Shield, carrier rejector filter	69 C929
	Shield, case (front final tank)	69C826
	Shield, case (front mult)	69C823
	Shield, case (rear final tank)	69C827
	Shield, case (rear mult)	69C824
	Shield, case (VFO & Xtal switch)	69C857
	Shield, center (coil assy)	69B822
	Shield, chassis top	69B840
	Shield, coil	69A828
	Shield, mixer grid (1675-1775)	69 A938
	Shield, rear	69C747
	Shield, tube	69-863
	Shield, tube	69A097
	Shield, tube	69A306
	Shield, tube	69A519
	Shield, tube	69B834
	Shield, tube	69B838
	Shield, tube (noval)	69B855
	Shield, (VFO)	69C900
V-10, 11	Socket, octal	6A317
V-1, 5, 14, 15, 19		
	Socket, 9 pin (mica filled)	6B664
V-13	Socket, 9 pin min w/base	6B672
V-2, 3, 4, 6, 7, 8, 16, 17, 22		
	Socket, tube, (7 pin min)	6B505
V-18	Socket, tube (7 pin min cer)	6A354
V-20, 21	Socket, tube (8 pin octal)	6A296
V-9, 12	Socket, tube (9 pin min) mica filled	6B500
4XMJLT	Socket, Xtal	6A346
	Spacer	73A458
	Spacer, gear plate (1-2)	73B1052
	Spacer, gear plate (2-3)	73A1083
	Spacer, stop arm	73A1208
	Spacer, switch	73A1209
	Spacer, switch	73A1243
	Spacer, switch (3/16)	73A1132
	Spring	75A345
	Spring, compression (idler gear)	75 A376
	Spring, tension	75B417
	Spring, tension (stop arm)	75A381
	Stop, balance mod.	74B1244
	Stop, knob	74B1245
	Strap, copper	76-371
	Stud, arm link	73A860
	Stud, shoulder	73B1127
	Stud, shoulder (stop arm)	73B1123
	Support post	73A1197
	Terminal strip, special	88A1355
	Window, Dial panel	22C438

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

94X1404
956

PROCEDURE:

The rf alignment procedure for all bands is essentially the same, differences being only in frequency used and parts adjusted. The following is the alignment procedure for 80 meters. Frequency settings and parts to be adjusted for the 40, 20 and 10 meter band may be obtained from the chart above. The controls must be preset at their INITIAL CONTROL SETTINGS (paragraph 5-2) with the BAND SELECTOR switch set on the band being aligned (80 meters).

1. Adjust trimmers (C198, C209, C220, and C231) to mid-capacity.
2. Rotate the DRIVER TUNING control fully clockwise (open gang).
3. Set the rf generator frequency to f1 (4.2 mc) using sufficient generator output to obtain a readable indication on the VTVM.
4. Adjust the FINAL TUNING control for maximum indication on the VTVM.
5. Preset slugs of rf coils (L12, L16, L20, and L24) to their maximum counterclockwise position (minimum inductance).
6. Carefully adjust each slug clockwise for maximum indication on the VTVM.
7. Rotate the DRIVER TUNING control fully counterclockwise (closed gang).
8. Adjust the output frequency of the rf generator for maximum indication on the VTVM. Generator frequency resulting in maximum indication should be approximately f2 (3.4 mc).
9. Adjust the FINAL TUNING control for maximum deflection on the VTVM.
10. Adjust slugs of rf coils (L12, L16, L20, and L24) noting if the slug goes in or out (increased or decreased inductance) to obtain maximum indication on the VTVM. If slug adjustment increases inductance, the companion trimmer capacitor must be decreased in value accordingly. Conversely, if slug adjustment decreased inductance, the companion trimmer capacitor must be adjusted for a comparative increase in value. The trimmers and associated rf coils are listed directly opposite each other in the chart above.
11. Set the rf generator frequency to f3 (4.0 mc) for high end tracking and adjust DRIVER TUNING, FINAL TUNING, and all rf coils (L12, L16, L20, and L24) for maximum deflection on the VTVM.
12. Set the rf generator frequency to f4 (3.5 mc). Adjust DRIVER and FINAL tuning controls for maximum meter indication; then repeat Procedure 10.
13. Procedures 11 and 12 must be repeated until the adjustments of the rf coils (Procedure 10) results in no appreciable increase in meter deflection. The band is then correctly tracking with maximum output.

6-6. NEUTRALIZATION OF FINAL AMPLIFIER

Step	Signal Generator Connections	VTVM Connections	Control Setting	Remarks
1	High side to R.F. OUTPUT connector. (Without .01 MFD capacitor.) Common side to chassis.	VTVM rf probe to pin No. 5 (grid of V10. Common side to chassis.	BAND SELECTOR 14.-14.35 MC position. (All other controls at INITIAL CONTROL SETTINGS.)	Adjust rf generator to 14.7 MC at 1 volt output.

PROCEDURE:

1. Adjust DRIVER TUNING for maximum deflection on VTVM.
2. Adjust FINAL TUNING for a dip in the meter on the rf generator. The dip indicates a desired resonant condition.
3. Adjust neutralizing capacitor C242 (Fig. 7) for a minimum indication on the VTVM.
4. Repeat entire procedure until the adjustment of capacitor C242 results in no appreciable decrease in the VTVM reading. The final amplifier stage is then properly neutralized.

6-7. SS BAL. ADJUSTMENT

The SS BAL. control is a potentiometer (R33, Fig. 5) in the plate circuits of the 1675 kc oscillator (V5A) and 1775 kc oscillator (V5B, Fig. 5) stages. This control is utilized to maintain sideband symmetry and may not require adjustment throughout the use of the transmitter-exciter. However, if adjustment is necessary, proceed as follows;

1. Tune the transmitter-exciter on CW operation as instructed in paragraph 4-3.
2. Rotate the FUNCTION switch to "UPPER SIDEBAND" and note the reading of the front panel meter.

3. Rotate the FUNCTION switch to "LOWER SIDEBAND". The meter indication for both "UPPER" and "LOWER SIDEBAND" should be essentially the same. Any difference in output between the 1675 kc oscillator and 1775 kc oscillator can be compensated by adjusting the SS BAL. control. Rotating the SS BAL. control will increase the output of one sideband and decrease the other simultaneously. Consequently, it is necessary to alternate between the "UPPER" and "LOWER SIDEBAND" positions of the FUNCTION switch, checking for equal output, while adjusting the SS BAL. control.

6-8. PHASE BAL. AND AMP. BAL. ADJUSTMENT

The PHASE BAL. (R10) and AMP. BAL. (R9) controls are potentiometers located on the top of the transmitter-exciter chassis (Fig. 5). These controls maintain the proper phase and amplitude relation at the input of the balanced modulator stage V1 and V2. Both controls are factory set and readjustment should not be required unless component parts have been replaced in the balanced modulator. The adjustment of the PHASE BAL. and AMP. BAL. controls is divided into a minor and major adjustment. If the carrier suppression is less than 20 db down, the minor adjustment should be performed. If it is impossible to obtain a carrier suppression of at least 20 db with the minor adjustment, the major adjustment must be performed.

A. MINOR ADJUSTMENT

1. Tune the transmitter-exciter for CW operation.

2. Set the FUNCTION switch to "DSB" position.

3. Set the CARRIER INJECTION control to "O". The LEVEL INDICATOR METER should read at least 20 db carrier suppression.

4. If carrier suppression is less than 20 db, loosen the two knurled knobs at each side of the CARRIER INJECTION control on the mechanical reference indicator stop and rock the CARRIER INJECTION control for maximum carrier suppression.

5. If carrier suppression is less than 20 db, adjust the PHASE BAL. and CARRIER INJECTION controls simultaneously for maximum carrier suppression. The PHASE BAL. control is very sensitive, consequently its adjustment is critical.

6. If at least 20 db carrier suppression is obtained by performing step 5, the mechanical reference indicator stop can be locked in place with the index directly opposite the "O" of the CARRIER INJECTION control. Locking the mechanical stop in this manner will assure a ballanced condition and maximum carrier suppression whenever the CARRIER INJECTION control is returned to "O".

7. Set the FUNCTION switch to "UPPER" or "LOWER SIDEBAND" position. The LEVEL INDICATOR METER should read at least 40 db carrier suppression.

B. MAJOR ADJUSTMENT (See Figures 4 and 5 for parts location)

1. Perform the first five steps of the minor adjustment.

2. Detune the DRIVER TUNING for ease of adjustment.

3. Set PHASE BAL. to mid-range and adjust the AMP. BAL. and CARRIER INJECTION controls simultaneously for maximum carrier suppression.

4. Adjust the PHASE BAL. and CARRIER INJECTION controls simultaneously for maximum carrier suppression.

5. Retune DRIVER TUNING as per CW operation.

6. Readjust the AMP. BAL., PHASE BAL., and CARRIER INJECTION controls for maximum carrier suppression. The LEVEL INDICATOR METER should read at least 20 db carrier suppression.

7. Set the FUNCTION SWITCH to "UPPER" or "LOWER SIDEBAND". Connect a lead from the Receiver antenna post to the Dummy Load and adjust the Receiver (tuned for CW operation) to the beat note of the operating frequency.

CAUTION

Care must be excerised to insure little or no carrier is injected into the receiver.

8. Adjust L25 and R151 for a null of the beat note in the receiver. Remove the lead between the Receiver and the Dummy Load. The LEVEL INDICATOR METER should read at least 40 db carrier suppression.

9. If necessary, repeat the entire procedure until a carrier suppression of at least 20 db in "DBS" and 40 db in "SSB" are obtained.

10. Lock the mechanical reference indicator stop as instructed in step 6 of MINOR ADJUSTMENT. The adjustment is now complete.

SECTION VII
MAINTENANCE

7-1. MALFUNCTION ISOLATION AND CORRECTION

Throughout the design of the Model HT-30 Transmitter-exciter, full consideration was given to keep maintenance problems at an absolute minimum. In all well designed communications equipments, maintenance and repair problems are generally confined to the checking and replacement of tubes which may become defective. Malfunctions of this nature are easily isolated and corrected. However, it is entirely possible that a more obscure malfunction may arise. In this event, only thoroughly trained technical personnel should attempt servicing the unit. The schematic diagram, voltage charts, and the following table will prove to be a valuable aid in isolating and correcting a malfunction.

Symptom	Possible Cause
1. Dead unit.	Bad AC connection, POWER control at "POWER OFF", blown fuse (F1), open primary (T1).
2. Lack of B+ in high voltage supply.	Defective V20, open secondary (T1), open L3.
3. Lack of B+ in low voltage supply.	Defective V21, open secondary (T1), open L1 or L2.
4. Filaments of V20, and V21 light, all others out.	Defective filament winding (T1 secondary).
5. Insufficient or no bias.	Defective R129, SR1, R130, R133, R135, and R136.
6. Lack of B+ to the VFO and 50 kc oscillator stages.	Open R138.
7. Excessive hum on carrier output.	Open C254, or heater to cathode leakage in V2, V3, V12, and V13. Also, leakage in any signal stage where the cathode is above ground.
8. Normal operation with VFO but little or no output on XTAL operation.	Defective crystal, V19A, and/or associate circuitry.
9. Normal operation on 80, 40, and 10 meters but little or no output on 20 meters.	Defective V15B or associate circuitry.
10. Normal operation on 80, 40, and 20 meters but little or no output on 10 meters.	Defective V15A, V19B, or associate circuitry.
11. Normal operation on 80 and 40 meters but little or no output on 20 and 10 meters.	Defective V15, V16, or associate circuitry.
12. "UPPER SIDEBAND" SSB operation normal on 80 and 20 meters but little or no output on "LOWER SIDEBAND".	Defective V5A, CR1 (1675 kc XTAL), or associate circuitry.
13. "UPPER SIDEBAND" SSB operation normal on 40 meters but little or no output on "LOWER SIDEBAND".	Defective V5B, CR2 (1775 kc XTAL), or associate circuitry.
14. CW operation normal but little or no modulation on DSB or SSB.	Improper setting of SPEECH LEVEL, defective V12A, V13, or associate circuitry.
15. CW and BSD operation normal but little or no power output on SSB.	Defective V4, or associate circuitry.
16. DRIVER TUNING adjustment will peak on panel meter but little or no indication when adjusting FINAL TUNING control.	Defective V10, V11, or associate circuitry.
17. Crystal operation normal but little or no output with VFO.	Defective V18, T10, or associate circuitry.

7-2. VOLTAGE MEASUREMENT

Tube socket voltages for the Transmitter-exciter are shown in Fig. 10 and Fig. 11. Voltage readings for the 50 kc oscillator (V1), 1675/1775 kc oscillator (V5), vox amp, and relay tube (V14), 5.21/10.42 mc oscillator (V15), vfo (V18), and the crystal oscillator and 4X multiplier (V19) must be taken from the top of the chassis as they are unattainable from the underside. Access to pin voltages are easily obtained by utilizing commercially available tube adapters. The adapters

have external test prod points and are simply inserted between the tube and socket.

It is possible to also obtain pin voltages by removing the tube and winding one or two turns (insulation removed at turns) of #20 solid wire around the pin in question and re-inserting the tube in its socket. However, if this procedure is followed, care should be exercised to prevent inadvertent shorting of the tube pin to chassis or to the adjacent tube pin.

Specific conditions, under which voltage measurement is made, are noted on each voltage chart.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-34....	1.5-7 mmf., trimmer	44A457
	Trimmer strip	44 B464
C-181...	3-12 mmf., trimmer	44A465
C-161...	10 mfd. 50 V, elect.	45B211
C-162, 163, 164, 94		
	2 x 40 mfd. 350 V; 40 mfd. 400 V; 40 mfd. 500 V., elect.	45 C301
C-160, 95, 254		
	10 mfd. 150 V, elect.	45B307
C-83....	390 mmf., 10% 500 V	47X20B391K
C-91....	.1 mfd. 200 V, molded paper	46BR104L2
C-167...	.22 mfd. 200 V, molded paper	46BR224L2
C-168...	.047 mfd. 200 V, molded paper	46BR473L2
C-85,10.	.47 mfd. 200 V, molded paper	46BR474L2
C-60A, B	2 x .004 mfd. 500 V, Cer Disc	47A218
C-24, 28, 29, 31, 32, 33, 37, 39, 46, 53, 55, 58, 65, 70, 74, 75, 78, 80, 82, 89, 90, 92, 99, 100, 108, 109, 111, 112, 120, 136, 140, 143, 144, 145, 149, 158, 159, 165, 166, 169, 170, 171, 232, 233, 234, 235, 236, 237, 238, 239, 240, 244, 245, 257, 126, 127, 149	.01 mfd. 500 V, cer disc.	47A224
C-6, 106, 96	.001 mfd. 500 V, cer disc.	47B230
C-5, 7, 15, 17, 18, 20, 40, 79, 81, 86, 93, 189, 201, 212, 264, 221, 47	.02 mfd. 500 V, cer disc.	47A242
C-68....	.001 mfd. 3000 V, cer disc.	47A311
C-101, 103, 139, 142, 148	.002 mfd. 500 V, cer disc.	47A395
C-114, 177	0.51 mmf. 10% 500 V, fixed	47B403-0
C-265, 266, 267, 268	2.2 mmf. 10% 500 V, fixed	47B403-4
C-199...	1 mmf. 10% 500 V, fixed	47B403-2
C-196...	2.7 mmf. 10% 500 V, fixed	47B403-14
C-131...	47 mmf. 500 V, fixed mica	47CB470K
C-56, 57, 61, 63, 64, 67, 118, 119, 246	.005 mfd. 500 V, cer disc.	47A442
C-223, 241, 187, 210	.005 mfd. 20% 500 V, cer disc.	47B523
C-76....	180 mmf., fixed toothpick	47-595
C-72....	220 mmf., fixed toothpick	47-596
C-124, 125	1000 mmf 5% 300 V, fixed mica	47A623
C-248...	400 mmf. 5% N 5250, fixed cer.	47A639
C-69....	.01 mfd. 1000 V, cer disc.	47 A598
C-87....	1000 mmf. 10% 500 V, mica.	47X20B102K
C-4, 8, 9.	1000 mmf. 5% 500 V, mica	47X20D102J
C-84....	1200 mmf. 10% 500 V, mica.	47X20B122K
C-88....	1500 mmf. 10% 500 V, mica.	47X20B152K
C-197, 208, 219, 230	240 mmf. 2% 500 V, mica	47X20D241G
C-12....	300 mmf. 2% 500 V, mica	47X20D301G
C-13, 19, 22	330 mmf. 2% 500 V, mica	47X20D331G
C-3.....	330 mmf. 5% 500 V, mica	47X20D331J
C-128, 129, 130	10,000 mmf. 10% 300 V, mica	47X40E103K
C-14, 23.	180 mmf. 1% 500 V, mica	47X20F181F
C-1, 2..	470 mmf. 2% 500 V, mica.	47X20F471G
C-269...	12 mmf. ±5%, N1500 ±250 PPM cer.	47D20V120J
C-251, 252	7500 mmf. 2% 500 V, mica	47X35F752G
C-247...	68 mmf. 5% NPO	47X32CG680J
C-253, 256	220 mmf. 2% N330	47X35SH221G
C-150, 156	1.5 mmf. ±.25 mmf NPO, fixed cer. tub	47X20CG015G
C-153...	2.2 mmf. ±25% NPO, fixed cer.	47X20CG2R2C
C-25....	3 mmf. 2% NPO, cer.	47X20CG030G
C-132...	6 mmf., 10%, cer	47X20CG060K
C-73....	4 mmf. 5% NPO, cer tub	47X20CG040J
C-262...	5 mmf. ±.25 mmf, NPO cer	47X20CG050C
C-43, 50.	5, +.5 N 250	47X20UJ050D
C-54, 259	10 mmf. 5% NPO, cer	47X20CG100J
C-270...	12 mmf. ±5%, NPO ±30 PPM, cer.	47X20CG120J
C-258...	15 mmf. 5% NPO, cer	47X20CG150J
C-123...	22 mmf. ±5% N80 ±30 PPM, cer	47X20LG220J
C-172, 175, 176	20 mmf. 5% NPO, cer	47X20CG200J
C-98....	24 mmf. 2% NPO, cer tub	47X20CG240G
C-260...	22 mmf. 5% NPO, cer.	47X20CG220J
C-141...	27 mmf. 5%, 500 V, fixed cer tub	47X30CG270J
C-26, 35, 185	33 mmf. 2% NPO, cer	47X30CG330G
C-222...	33 mmf.	47X25CG330J
C-104...	36 mmf. 2%, cer tub.	47X30CG360G
C-27, 36, 102, 105, 137, 138, 152, 155, 191, 203, 213	47 mmf. 2% NPO, fixed cer tub	47X25CG470G
C-97....	82 mmf. 2%, NPO, cer tub.	47X32CG820G
C-186...	5 mmf. 10% N750, cer.	47X20UK050K/D
C-261...	100 mmf. 5% N750.	47X25UK101J
C-107...	100 mmf. 10% N750.	47X25UK101K/D
C-184, 255	100 mmf. 10% N750, cer cer	47X30UK101K/D
C-59....	110 mmf. 10% 500 V. cer	47X15D111K
C-30, 16, 21, 62, 180, 182, 183	47 mmf. 10% N750, cer.	47X20UK470K/D
C-247...	68 mmf. 10% N750, cer.	47X30UK680K/D
C-250...	220 mmf. N2200 10%, cer.	47D25W221K
C-11....	75 mmf. 10% N750, cer.	47X30UK750K/D
C-192, 205, 216, 228	82 mmf. 5% 500 V, cer.	47X25RH820J
	Trimmer, variable	48D316
C-121...	Variable capacitor, main tuning.	48C343
C-71....	Variable capacitor, air, final tank	48D344
C-193, A, B, C, D	Variable capacitor, RF Amp, front	48D353
C-193, E, F, G, H	Variable capacitor, RF Amp, rear	48D364
C-146, 151, 154, 157	Variable capacitor, 4th Harm. Mult.	48D365
C-243...	Variable capacitor, trimmer.	48-375
C-122...	Variable capacitor, trimmer.	48-376
C-249...	Variable capacitor	48 B384
	RESISTORS	
R-157...	470K 10% 1/2 w	23X20X474K
R-145, 146	470K ohm 1% 1/2 w comp.	23DCC474
R-149...	Temp. comp	23A120
R-56, 67, 71, 117, 126, 141, 140, 108	1000 ohm 10% 1/2 w comp.	23X20X102K
R-15, 147	1000 ohm 5% 1/2 w comp.	23X20X102J
R-49, 88, 96, 100, 122	10,000 ohm 10% 1/2 w comp	23X20X103K
R-23, 42, 45, 47, 51, 87, 89, 104, 109, 114, 125, 127, 133, 156	100K ohm 10% 1/2 w comp.	23X20X104K
R-6, 64, 79, 84, 86	1 meg. 10% 1/2 w comp.	23X20X105K
R-39, 40.	1200 ohm 10% 1/2 w comp.	23X20X122K
R-95, 101	150K ohm 10% 1/2 w comp.	23X20X154K
R-158...	150K ohm 5% 1/2 w comp.	23X20X154J
R-150...	18K ohm 5% comp	23X20X183J
R-5.....	2200 ohm 5% 1/2 w comp.	23X20X222J
R-20, 78.	2200 ohm 10% 1/2 w comp.	23X20X222K
R-3, 4, 63, 131	22K ohm 10% 1/2 w comp.	23X20X223K
R-66, 105, 136, 70	220K ohm 10% 1/2 w comp.	23X20X224K
R-72....	2.2 meg 10% 1/2 w comp.	23X20X225K
R-97, 99.	2700 ohm 10% 1/2 w comp.	23X20X272K
R-155...	270K ohm 10% 1/2 w comp.	23X20X274K
R-48, 106, 111	330 ohm 10% 1/2 w comp.	23X20X331K
R-90....	3300 ohm 10% 1/2 w comp.	23X20X332K
R-130...	33K ohm 10% 1/2 w comp.	23X20X333K
R-19, 24, 152	330K ohm 10% 1/2 w comp.	23X20X334K
R-2, 7, 8.	3900 ohm 5% 1/2 w comp.	23X20X392J
R-118...	3900 ohm 10% 1/2 w comp.	23X20X392K
R-57, 59, 144	47 ohm 10% 1/2 w comp.	23X20X470K
R-85....	470 ohm 10% 1/2 w comp.	23X20X471K
R-14, 18.	4700 ohm 5% 1/2 w comp.	23X20X472J
R-98, 129, 153	4700 ohm 10% 1/2 w comp.	23X20X472K
R-11, 12, 21, 50, 52, 80, 81, 107, 112 113, 123, 137, 110	47K ohm 10% 1/2 w comp.	23X20X473K
R-1, 25, 26, 37, 38, 93, 94, 102, 103, 119, 120	4.7 meg. 10% 1/2 w comp.	23X20X475K
R-46, 53.	560 ohm 10% 1/2 w comp.	23X20X561K
R-121, 135	5600 ohm 10% 1/2 w comp.	23X20X562K
R-77, 124.	56K ohm 10% 1/2 w comp.	23X20X563K
R-41, 44.	560K ohm 10% 1/2 w comp.	23X20X564K
R-128...	68 ohm 10% 1/2 w comp.	23X20X680K
R-43....	680 ohm 10% 1/2 w comp.	23X20K681K
R-65, 69.	68K ohm 10% 1/2 w comp.	23X20X683K
R-142, 143	820 ohm 10% 1/2 w comp.	23X20X821K
R-16, 22, 75, 83	82K ohm 10% 1/2 w comp.	23X20X823K
R-82....	1000 10% 1 w comp	23X30X102K
R-154...	150K ohm 1 w comp.	23X30X153M
R-29, 34.	100K 10% 1 w comp	23X30X104K
R-31....	1200 ohm 10% 1 w	23X30X122K
R-17....	120K ohm 10% 1 w comp.	23X30X124K
R-27, 36.	1500 ohm 10% 1 w comp.	23X30X152K
R-115...	22,000 ohm 10% 1 w comp.	23X30X223K
R-35, 145	27K 10% 1 w	23X30X273K
R-116, 30, 32	4700 ohm 10% 1 w comp.	23X30X472K
R-13, 58.	47K ohm 10% 1 w comp.	23X30X473K
R-138A, 91	1200 ohm 10% 2 w comp.	23X40X122K
R-132...	150K ohm 10% 2 w comp.	23X40X154K
R-55....	22K ohm 10% 2 w comp.	23X40X223K
R-134...	330K ohm 10% 2 w comp	23X40X334K
R-76....	39K ohm ±10% 2 w comp.	23X42X393K
R-54....	470 ohm 10% 2 w comp.	23X40X471K
R-60....	4700 ohm 5% 2 w comp.	23X40X472J
R-61....	6800 ohm 5% 2 w comp.	23X40X682J
R-138...	2500 ohm 5% 10 w W.W.	24BG252D
R-62....	Variable, 50K W.W. (meter composition)	25B1227
R-33....	Variable, 100K side band bal.	25B1136
R-68, 139	Variable, 1 meg speech level voice control	25B1137
R-73....	Variable, 1 meg speech level	25B1138
R-10....	Variable, 2K injection W.W.	25B1393
R-74....	Variable, 5 meg. - time delay	25B1141
R-92....	Variable, 50K ohm, calibrate level	25B1273
R-148...	Variable 500 ohm W.W.	25B1391
R-9.....	Variable 5000 ohm	25B1392
R-151...	Variable, 12.5K ohm	25B1394
	TRANSFORMERS AND COILS	
L-25....	Coil Assy. carrier rej. filter.	50B700
L-4.....	Coil Assy. VFO	51B1940
L-9, 13, 17, 21	Coil, RF (28.0-29.7 MC).	51B2015
L-10, 14, 18, 22	Coil, RF (14.0-14.35 MC).	51B2016

communications

70047

OPERATING and SERVICE INSTRUCTIONS

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HT-32
MARK I

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Figure 1. Hallicrafters Model HT-32 Transmitter/Exciter

SECTION I
GENERAL

1-1. The Hallicrafters Model HT-32 Transmitter/Exciter is the ultimate in design of self-contained transmitting equipment. This twenty-tube precision built transmitter/exciter is capable of SSB (single sideband with suppressed carrier), DSB, and CW transmission in the 80, 40, 20, 15, 11, and 10 meter bands. This unit can represent the complete transmitting complement of any amateur station. The only requirements for immediate "on the air" operation are a 50-ohm terminated antenna system, key or microphone, and AC power source.

1-2. This unit may be utilized as a complete self-contained transmitter, or as an exciter for a linear power amplifier such as the Hallicrafter Model HT-33. If other linear amplifiers are employed, they should be capable of supplying a 50-ohm termination to the driver output to utilize the full capabilities of the HT-32. Maximum power output ratings of the HT-32 are:

SSB, 70-100 watts P.E.P. (peak envelope power);
CW 70-100 watts; and DSB 17-25 watts (carrier power).

Prominent features of the HT-32 Transmitter/Exciter are:

- New high frequency crystal sideband filter - rejection 50 db. or more.
- Bridged-tee sideband modulator.
- C.T.O. direct reading in kilocycles to less than 300 cycles from reference point.
- 144 watts plate input (P.E.P. two-tone).
- Six band output (80, 40, 20, 15, 11-10 meters).
- Unwanted sideband down 50 db. or more.
- Distortion products down 30 db. or more.
- Carrier suppression down 50 db. or more.

1-3. T.V.I. (Television Interference) SUPPRESSION.

The HT-32 has been designed and constructed to suppress spurious radiations that may cause television interference. The TVI problem was given full consideration in the design of every circuit as well as in the selection and layout of parts. Adequate filtering has been provided for control circuits and AC power lines. Components were specifically selected to avoid undesired resonances and arranged to prevent parasitic oscillation.

Another important T.V.I. proofing feature is employed in the output coupling circuit of the final amplifier. The tuned output circuit is a pi network that has inherently excellent harmonic suppression ability. The unique design of this network is such that the conventional loading control is unnecessary and only the final tank tuning need be adjusted. The pi network is connected to a coaxial connector and permits the use of any antenna system having a transmission line impedance of 50 ohms. In addition to these factory installed precautions, a 50-ohm low pass TVI filter, which connects between the antenna and the transmitter/exciter output, is available as an accessory. This unit

may be obtained from your Hallicrafters dealer under part number 1X2621.

The Model HT-32 Transmitter/Exciter, as received from the factory, has had every advantage of Hallicrafters advanced engineering to minimize television interference. There are, however, some types of TVI that cannot be prevented within the transmitter itself. For example, when a television receiver is located in the immediate vicinity of the transmitter/exciter it is entirely possible that a fundamental signal will reach the input grid of the receiver in sufficient strength to cause a slight amount of interference. In such cases, it will be necessary to install a filter or trap at the television receiver to attenuate the transmitter's fundamental signal. If the interfering signal does not enter the television receiver through the antenna, special shielding or filters on the TV receiver may be necessary. For a more complete discussion of measures that may be used to handle these special television interference problems, refer to the ARRL HANDBOOK.

SECTION II
INSTALLATION

2-1. UNPACKING.

After unpacking the HT-32 Transmitter/Exciter, examine it closely for any possible damage which may have occurred during transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for any special instructions before removing or destroying them.

2-2. LOCATION.

Although the Model HT-32 Transmitter/Exciter is provided with a built-in power driven fan for cooling purposes, avoid excessively warm locations such as those near radiators and heating vents. The unit should be placed in a location that provides adequate space around it, permitting free circulation of air through the cabinet openings.

2-3. POWER SOURCE.

The HT-32 Transmitter/Exciter is designed to operate on 105 to 125 volt, 50-60 cycle AC current, power consumption is 375 watts.

IMPORTANT: If in doubt about your power source, contact your local power company prior to inserting the power cord into an AC power outlet. Plugging the power cord into the wrong power source can cause extensive damage to the unit, requiring costly repairs.

SECTION III
FUNCTION OF OPERATING CONTROLS

3-1. REAR CHASSIS CONNECTIONS (See Figure 2)

Sockets are provided on the rear of the HT-32 Transmitter/Exciter for the following purposes:

3-1-1 R. F. OUTPUT.

This is a coaxial connector which connects the Transmitter/Exciter to the antenna system or a linear amplifier. The connecting cable (52 ohm coax.) should be fitted with an Amphenol type 83-1SP connector or its equivalent. The selection of the type of antenna and coupling will depend upon the frequencies used and the purpose of operation. Refer to the ARRL ANTENNA HANDBOOK for detailed information concerning transmitting antennas.

3-1-2. CONTROL OUTLET.

An eleven pin socket is provided at the rear of the chassis to connect the HT-32 Transmitter/Exciter into your control system. The mating connector for this socket is an Amphenol 86-PM11. The instructions which follow may be modified to suit your particular needs.

3-1-3. KEY (Pins 8 and 9). For CW operation, the hand key or "bug" is connected to pins 8 and 9 of the control outlet. Pin 9 is internally grounded in the unit. When the key is up, cutoff bias is maintained at the third mixer and driver stages. Closing the key removes the cutoff bias providing signal excitation to the succeeding RF amplifier stages. A key jack is also provided at the front panel for those who prefer a panel connection for the key.

3-1-4. ANTENNA RELAY (Pins 2, 3, and 4). An external antenna change-over relay may be employed by utilizing pins 2, 3, and 4 on the control outlet. These pins are connected internally to insulated contacts on the VOX RELAY of the Transmitter/Exciter. Figure 4 illustrates typical connections of an external change-over relay to the control outlet. During periods of transmission the VOX relay connects pins 2 and 3 enabling the external power source to activate the external antenna change-over relay. For external applications where an open circuit is required when transmitting, pins 3 and 4 may be used. The voltage required of the external power source is dependent upon the type change-over relay used. A coaxial type relay for 50-ohm transmission line impedance is recommended.

3-1-5. RECEIVER AUDIO (Pins 9 and 10) AND SPEAKER (Pins 1 and 11).

Connect the audio output of the station's receiver directly to pins 9 and 10 of the control outlet. (Pin 9 is ground or chassis side.) Connect a 2 watt resistor

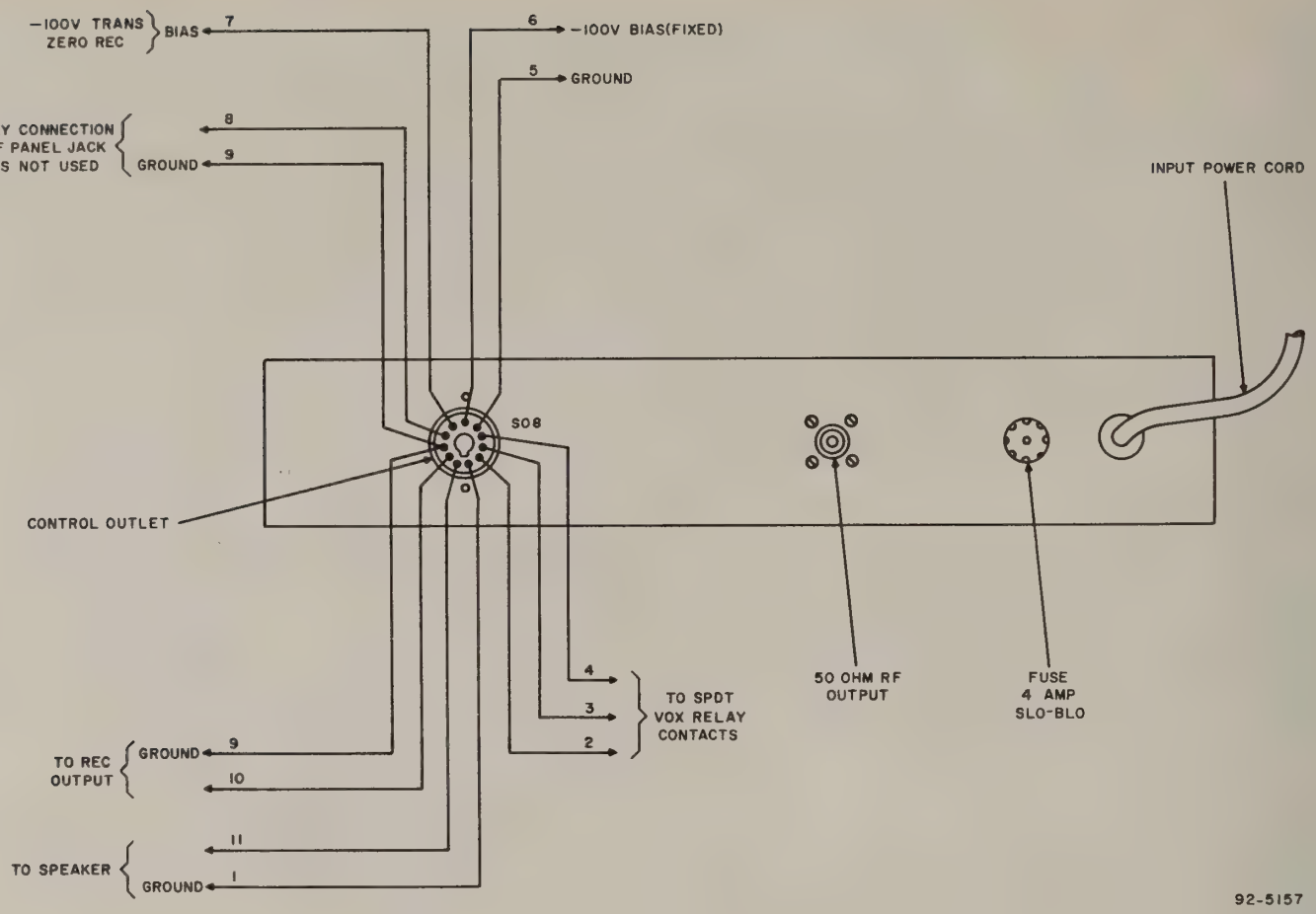


Figure 2. Rear Chassis Connections

across the receiver audio output to maintain a load at all times. The receiver speaker is connected directly to pins 1 and 11. (Pin 1 is ground side.) Connecting the receiver and speaker in this manner prevents the actuating of the transmitter/exciter VOX circuit by incoming audio signals from the receiver and also disconnects the receiver output to the speaker when the transmitter/exciter is on the air. Use an 18-ohm 2 watt resistor for 3 to 8 ohm voice coil impedances or 1500 ohm 2 watt resistor for 500-600 ohm outputs.

3-1-6. BIAS (Pins 5, 6, and 7). Cutoff bias (-100V) or control bias is available at either pin 6 or pin 7 with pin 5 used as the return or ground connection. At pin 6 the bias is fixed at -100V regardless of the mode of operation of the transmitter. At pin 7 the voltage is zero at standby or receive and -100V during transmission, an external relay may be used with the fixed bias provided at pin 6. Note that the bias source is high impedance and not intended as a "hard" bias source for fixed bias applications in power amplifiers.

3-2. FRONT PANEL CONTROLS

3-2-1. FUNCTION

The FUNCTION control is a four position rotary switch which selects CW, DSB, UPPER or LOWER SIDEBAND type of transmission as desired by the operator. An analysis of the FUNCTION switch operation is given in paragraphs 4-4, 4-5, and 4-6.

3-2-2. OPERATION

This control is a five position rotary switch which turns the power to the transmitter on or off, places the transmitter in calibrate operation or selects the mode of operation (VOX or MOX). The "CALIBRATE" position is used in conjunction with the CALIBRATE LEVEL control. (See paragraph 3-2-13.)

CAUTION

When turning off transmitter, stop momentarily in the "STANDBY" position, before turning switch to "OFF" position.

The "MOX" position energizes the transmitter control relay to the transmit position. This position of the OPERATION switch is used when manual control of transmission is desired. Return the switch to the "STANDBY" position during receiving periods.

3-2-3. In the "CALIBRATE" position, the transmitter/exciter control relay (VOX RELAY) is de-energized, permitting normal receiving operation with an antenna change-over relay (if used) in the receiver position. With the receiver in operation the transmitter signal can now be monitored and the signal level in the receiver controlled with the CALIBRATE LEVEL control. See paragraph 3-2-13.

3-2-4. In the "VOX" position, the transmitter control relay is operated by voice energy from the microphone.

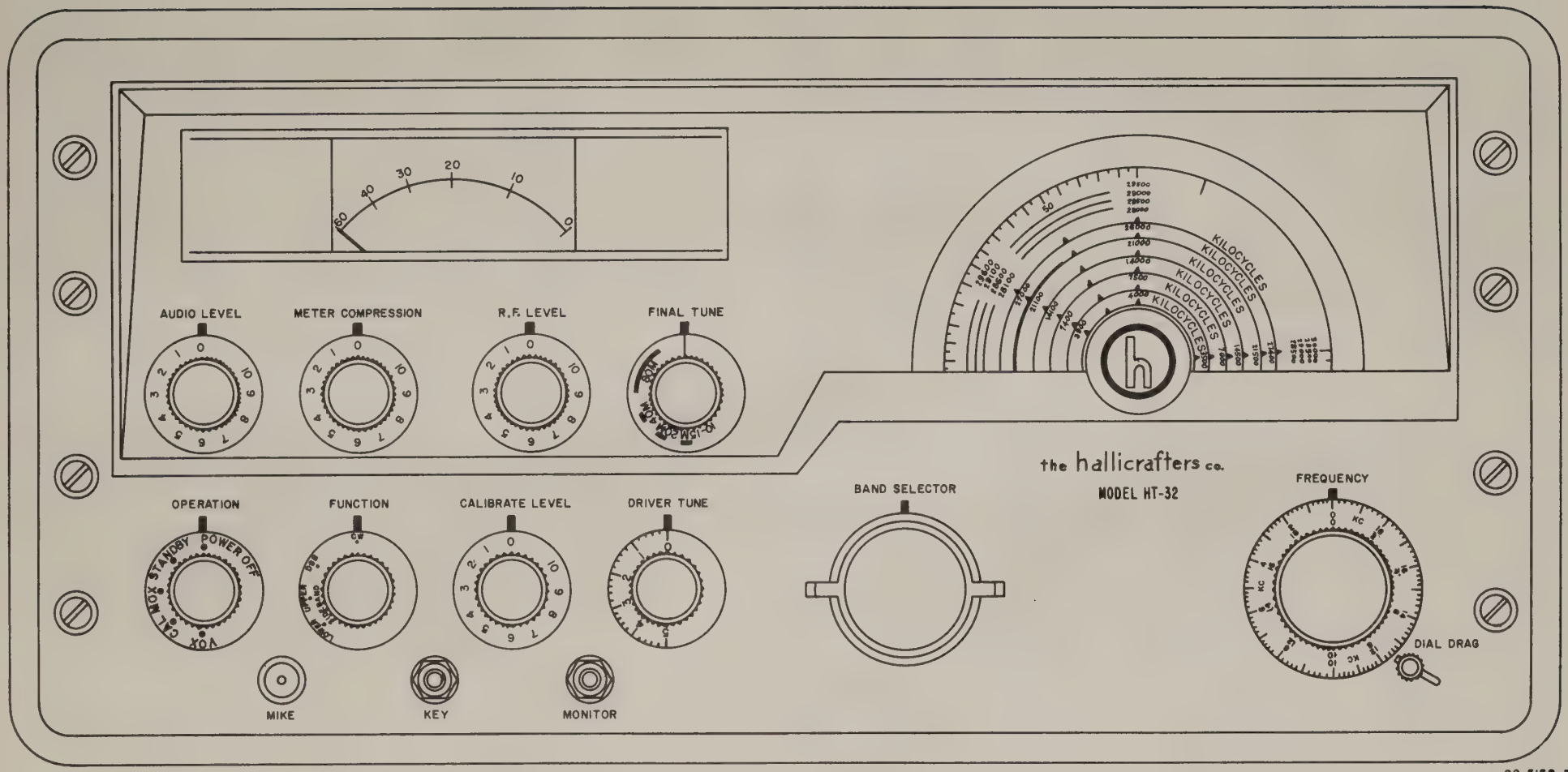


Figure 3. Front Panel

The relay tube is biased to cut-off and will not energize the VOX RELAY until signal excitation is received from the audio amplifier and vox amplifier stages.

3-2-5. DRIVER TUNING.

This control is a variable capacitor in the VFO mixer plate, and driver plate circuits, and will resonate the circuits to any frequency in the 80, 40, 20, 15 and 10-11 meter bands.

3-2-6. BAND SELECTOR.

The BAND SELECTOR control is a five position rotary switch which selects the proper combination of tuned circuits and stages for the desired frequency band. It also selects the correct crystal oscillator (4.05 or 13.95 MC) to produce the desired sideband when the FUNCTION switch is set at either "UPPER" or "LOWER SIDEBAND".

3-2-7. FINAL TUNING

This control is a variable capacitor in the final amplifier tank circuit and will resonate the circuit to the operating frequency of the selected band. The dial calibrations permit presetting the control roughly during tune up.

3-2-8. FREQUENCY

The FREQUENCY control is a variable capacitor which sets the VFO frequency. The VFO covers the frequency range 5,000 kilocycles to 5,500 kilocycles. With mixing circuits, the VFO will set the transmitter/exciter to the desired operating frequency as indicated on the dial in any of the five bands. Each minor marker on the skirt of the FREQUENCY control is equivalent to approximately 200 cycles on all bands.

3-2-9. DIAL DRAG.

This is a mechanical brake which can be adjusted either to lock or apply drag to the FREQUENCY control to avoid accidental rotation of the control during operation.

3-2-10. AUDIO LEVEL.

This control is a potentiometer connected in the grid circuit of the third audio amplifier stage and adjusts the amount of audio drive to the "bridged-T" balanced modulator. It has sufficient range to permit adjustment for any high level crystal microphone or low level dynamic microphone normally used for voice communications.

3-2-11. RF LEVEL.

The RF LEVEL control is a potentiometer in the grid bias circuit of the 9 mc amplifier tube to adjust the gain of the 9 mc amplifier. On DSB and CW, the amount of carrier in the output signal is determined by the setting of the RF LEVEL control.

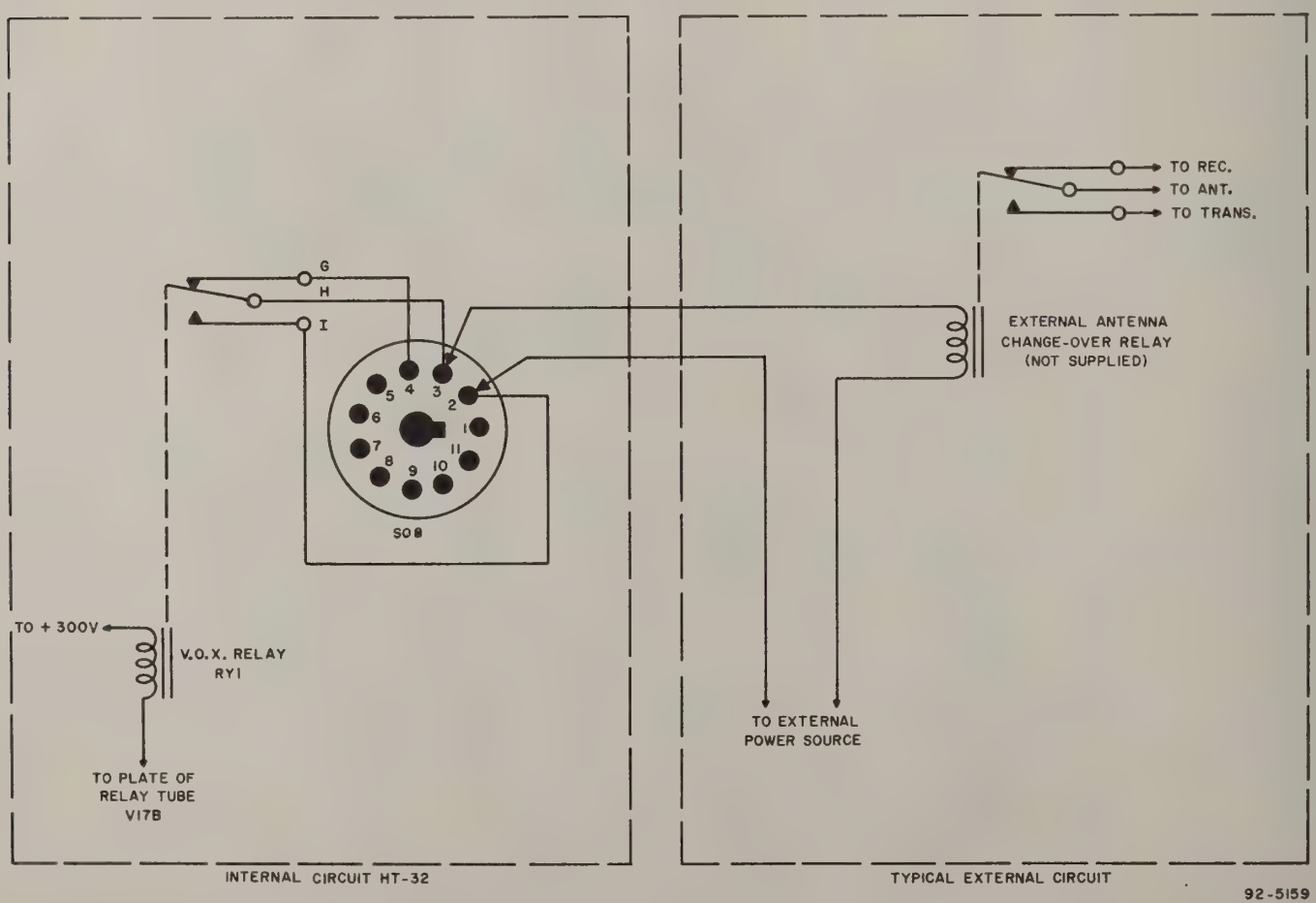


Figure 4. Control Outlet Relay Connections

3-2-12. METER COMPRESSION.

This is a meter sensitivity control which permits the operator to set the meter at maximum deflection (0 db) for desired output level (between approximately 1/4 power and full power) when establishing proper drive levels in the transmitter/exciter. (See LEVEL INDICATOR METER, paragraph 3-2-15.)

3-2-13. CALIBRATE LEVEL.

The CALIBRATE LEVEL control provides a low level adjustment of the transmitter output for SSB, DSB, or CW operation when the OPERATION control is set at CALIBRATE. The CALIBRATE LEVEL control is normally set to provide the desired signal level in the station receiver for monitoring purposes and need not be changed except possibly when changing bands. For CW or DSB work a carrier signal is obtained for "zero beat" frequency setting. On SSB a sideband signal is obtained when talking into microphone to "talk onto frequency". If the zero beat method is preferring by the sideband operator, the FUNCTION control is switched to DSB to obtain a carrier for calibration purposes then switched back to the desired sideband before going on the air. Note that on DSB or CW the preset RF LEVEL setting is not to be disturbed when calibrating.

3-2-14. MONITOR.

Inserting headphones into this jack permits voice controlled headphone reception in the VOX mode of operation. Inserting the plug of a headset in the jack will automatically cut off the receiver speaker when it is connected as instructed in paragraph 3-1-5.

3-2-15. LEVEL INDICATOR METER.

The LEVEL INDICATOR METER indicates the output of the transmitter/exciter in db below "0" db reference, enabling the adjustment of the transmitter/exciter for correct output (drive level required for a linear amplifier or approximate rated output for "barefoot" operation). Tuning of the transmitter has been simplified by the design of the front panel meter circuit. The meter scale is compressed to enable low-level signals to produce a usable indication, yet strong signals do not drive the meter pointer off scale. This feature gives the meter a wide usable dynamic range which is not possible to obtain with a linear scale. The desired amount of compression may be obtained by adjusting the METER COMPRESSION control on the front panel. The output reading on the LEVEL INDICATOR METER can be shifted to read full scale ("0" db) down to approximately 1/4 of full power and any level below this reference can easily be read on the meter. A log of METER COMPRESSION control settings, for normal output into loads of controlled and reproducible characteristics, will aid in re-establishing proper drive levels and determining the proper operation of the unit. The log should be recorded at various frequencies and modes of operation.

To monitor carrier suppression for SSB operation set the METER COMPRESSION control to read zero db reference on the meter at the maximum sideband output (single tone) and read carrier level directly when the audio excitation is removed. Note that the MOX mode of operation must be used for this test since in VOX operation the transmitter is disabled between voice controlled transmissions by the operation of the VOX relay.

SECTION IV
TUNING PROCEDURE

4-1. GENERAL.

The tuning procedure for the Model HT-32 Transmitter/Exciter has been simplified by design as much as possible to permit rapid adjustment by the operator. This does not mean, however, that a transmitter, commercial or home-built, may be operated successfully when only roughly adjusted. A clean signal from any transmitter requires good operator technique.

Two mis-tuning conditions on the HT-32 Transmitter/Exciter are possible, neither of which can be accidentally used on the air. These undesired signals are visible on the output meter due to the extreme range of levels handled by the metering circuit and are 60 db or more below fundamental output when the transmitter is correctly tuned up.

1. On the 15-meter band the undesired signal will appear when the DRIVER TUNE control is set outside its normal tuning range, approximately 0 to 1 division on the dial. Note that its level cannot be increased on AM or CW with the RF LEVEL control or driver by speech input on SSB, hence may be identified in this manner.

2. On the 10-meter band the undesired signal will appear when the DRIVER TUNE control is set outside its normal tuning range. For example when tuning the 29 mc to 29.5 mc segment of the 10-meter band, the DRIVER TUNE control will normally tune up around 4 on the dial while the unwanted signal tunes up at around 2 divisions on the dial. Here again it is identified by the fact that its level cannot be increased on AM or CW with the RF LEVEL control or driver on SSB with speech input.

4-2. LOAD.

Connect a 50-ohm non-reactive load to the R.F. OUTPUT connector on the Transmitter/exciter. This impedance may be an antenna or a properly adjusted linear amplifier. A 50-ohm non-reactive load of at least 100 watts dissipation capabilities is required to handle the full power output.

4-3. INITIAL CONTROL SETTINGS.

Set the front panel controls to their starting positions as outlined below.

OPERATION..... STANDBY (Power on)
FUNCTION..... DSB
AUDIO LEVEL.....0
R.F. LEVEL.....0

METER COMPRESSION.....5
CALIBRATE LEVEL 0
DRIVER TUNING.....CENTER OF ROTATION
FINAL TUNING..... DESIRED BAND SEGMENT
BAND SELECTOR ..... DESIRED BAND
FREQUENCY.....DESIRED FREQUENCY

4-4. CW TUNING.

The tuning procedure for CW operation will be presented first since AM (DSB) and SSB tuning procedures are modifications of that required for CW operation.

The tuning procedure for CW operation is as follows:

1. Set the OPERATION switch at MOX, FUNCTION switch at DSB.

2. Tune the driver and final amplifier stages, with the DRIVER TUNE and FINAL TUNE controls, for maximum meter deflection. Advance the RF LEVEL control slightly if necessary to obtain reasonable meter readings for tune up. Since these tuned circuits, as in any transmitter, effect transmitter performance, ALWAYS TUNE FOR MAXIMUM OUTPUT.

3. Set FUNCTION switch at CW and close key.

4. Advance the RF LEVEL control slowly while observing the output meter. When feeding a dummy or an antenna load set the control at a point where further rotation does not cause an appreciable increase in the meter reading. This is saturation output, operate slightly below this level for CW. When driving a final amplifier stage with the HT-32 Transmitter/Exciter, advance the RF LEVEL control until required excitation is obtained for the amplifier. In either case do not operate beyond the saturation level.

5. A convenient reference for this operating level may be obtained by setting the METER COMPRESSION control so that the output meter reads 0 db.

6. Recheck the driver and final tuning by reducing the carrier level by about 5 or 10 db on the output meter with the RF LEVEL control and touching up the DRIVER TUNE and FINAL TUNE controls for maximum output. Reset the RF LEVEL control for maximum output just below the saturation point as outlined above.

7. Open the key. The output should drop to zero.

8. When operating CW with separate transmitting and receiving antennas the OPERATION switch may be left in the MOX position since the transmitter is completely disabled when the key is open. If the transmitter and receiver share the same antenna, and the antenna change-over relay is operated by the relay in the transmitter, then the OPERATION switch must be set at STANDBY to place the receiver in operation. Refer to the use of the CAL position of the OPERATION switch and the CALIBRATE LEVEL control for "zeroing-in" on the receiver frequency. See paragraph 3-2-13.

4-5. SSB TUNING.

The tuning procedure for SSB operation is as follows:

1. Set the OPERATION switch at MOX, FUNCTION switch at DSB (Audio level zero).

2. Tune the driver and final amplifier stages as described for CW tune up.

3. Set the FUNCTION switch to UPPER or LOWER sideband as desired. If the output meter was referenced at 0 db for maximum output with the COMPRESSION control, the meter will now indicate the carrier suppression directly in db below maximum output.

4. Set the OPERATION switch at MOX (manual operation).

5. While monitoring the transmitter output, proceed with SSB transmission, setting the AUDIO LEVEL control for the required audio gain which does not produce peak flattening or overload distortion of the output signal. Note that the output meter damping factor prevents the meter from indicating 0 db reference on voice peaks. The meter will swing roughly 2/3 scale with voice excitation.

6. If manual operation is desired on SSB, switch the OPERATION control between MOX and STANDBY. For voice control operation with the receiver and transmitter interconnected, set the OPERATION control at VOX. To "zero-in" on frequency see paragraph 3-2-13 regarding the calibration procedure. For information on the use of the VOX, DELAY, and ANTI-TRIP controls see paragraphs 4-8, and 4-9.

4-6. AM (DSB) TUNING.

The tuning procedure for AM operation is as follows:

1. Set the OPERATION switch at MOX, FUNCTION switch at DSB (Audio level zero).

2. Tune the driver and final amplifier stages as described for CW tune up.

3. When feeding a dummy or antenna load advance the RF LEVEL control to the saturated output level and reference 0 db on the output meter with the METER COMPRESSION control as described for CW tune up. When driving a linear power amplifier with the HT-32 advance the RF LEVEL control until maximum linear power output is obtained from the final amplifier stage before setting the reference level on the output meter.

4. With the RF LEVEL control, reduce the carrier level 6 db as read on the output meter. This sets the maximum carrier level that the linear amplifiers in the HT-32 Transmitter/Exciter or following linear power amplifier can handle and provide 100% modulation capabilities. This carrier reference level can be established more precisely if an oscilloscope and audio oscillator are used to set up and monitor the output signal. Note that if the carrier level is set too high, peak amplitudes are flattened before 100% modulation occurs. If the carrier level is set too low the maxi-

mum power output capabilities are not attained at 100% modulation.

5. While monitoring the transmitter output, proceed with AM transmission, setting the AUDIO LEVEL control for the required audio gain which does not produce peak flattening or over modulation distortion of the output signal. Note that the output meter damping factor permits a rough operational check on over modulation. The output meter will drop about 1 to 2 db in level when the percentage of modulation with voice excitation runs close to 100%.

6. If manual operation is desired on AM, switch the OPERATION control between MOX and STANDBY. For voice control operation with the receiver and transmitter interconnected, set the OPERATION control at VOX.

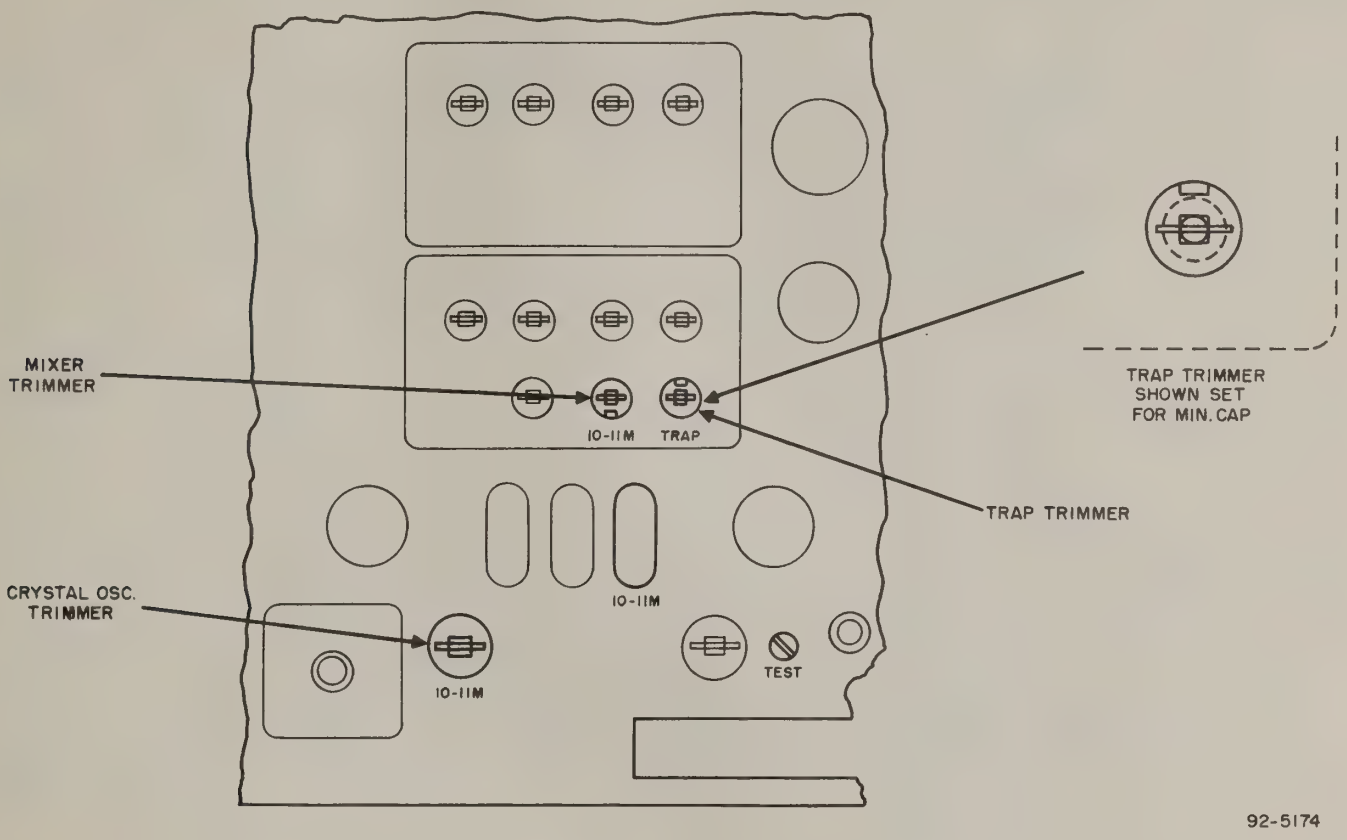


Figure 5. 10-11 Meter Band Adjustments

4-7. SEGMENT ALIGNMENT FOR 10-11M BAND.

The HT-32 Transmitter/Exciter is set up at the factory to provide transmission in the 28.5 to 29.0 MC segment of the 10M band.

The 11M band or other 0.5 MC segments of 10M band are set up as follows: (Refer to Figure 5 for locations of the various adjustments referred to in the following procedure.)

1. Tune up on CW and determine the saturation level setting of the RF LEVEL control. Record this setting for future reference in step 5.

2. Remove the 32.5 MC crystal and insert desired crystal. *

BAND	NOMINAL FREQ.	OUTPUT FREQ.	PART NUMBER
11M	*30.9Mc	26.96 - 27.23mc	19B1962
10M	*32.0Mc	28.0 - 28.5 mc	19B1963
10M	32.5Mc	28.5 - 29.0 mc	19B1964
10M	*33.0Mc	29.0 - 29.5 mc	19B1965
10M	*33.5Mc	29.5 - 30.0 mc	19B1966

*NOTE: These crystals are available but not supplied with the transmitter.

3. Connect electronic voltmeter or similar high impedance DC voltmeter (0-10V) to crystal oscillator test point, and adjust crystal oscillator trimmer for approximately half of the voltage obtained at the maximum voltage setting of the trimmer. Set the trimmer on the gentle slope side of resonance.

4. Set TRAP TRIMMER for minimum capacity and adjust 11-10M mixer trimmer for maximum output. Increase RF LEVEL control setting if necessary to pick up an output meter reading as the mixer is tuned to resonance. Back off the RF LEVEL as resonance is obtained with mixer trimmer and DRIVER TUNE control.

5. Touch up FINAL TUNE control then adjust crystal oscillator trimmer and RF LEVEL control until the saturation output again occurs at the RF LEVEL setting originally obtained for the previous crystal used. See step 1.

6. Trap adjustment - This adjustment is optional as far as spurious output in the 10M band is concerned since its level is less than 60 db below fundamental only when the transmitter is mistuned. To locate

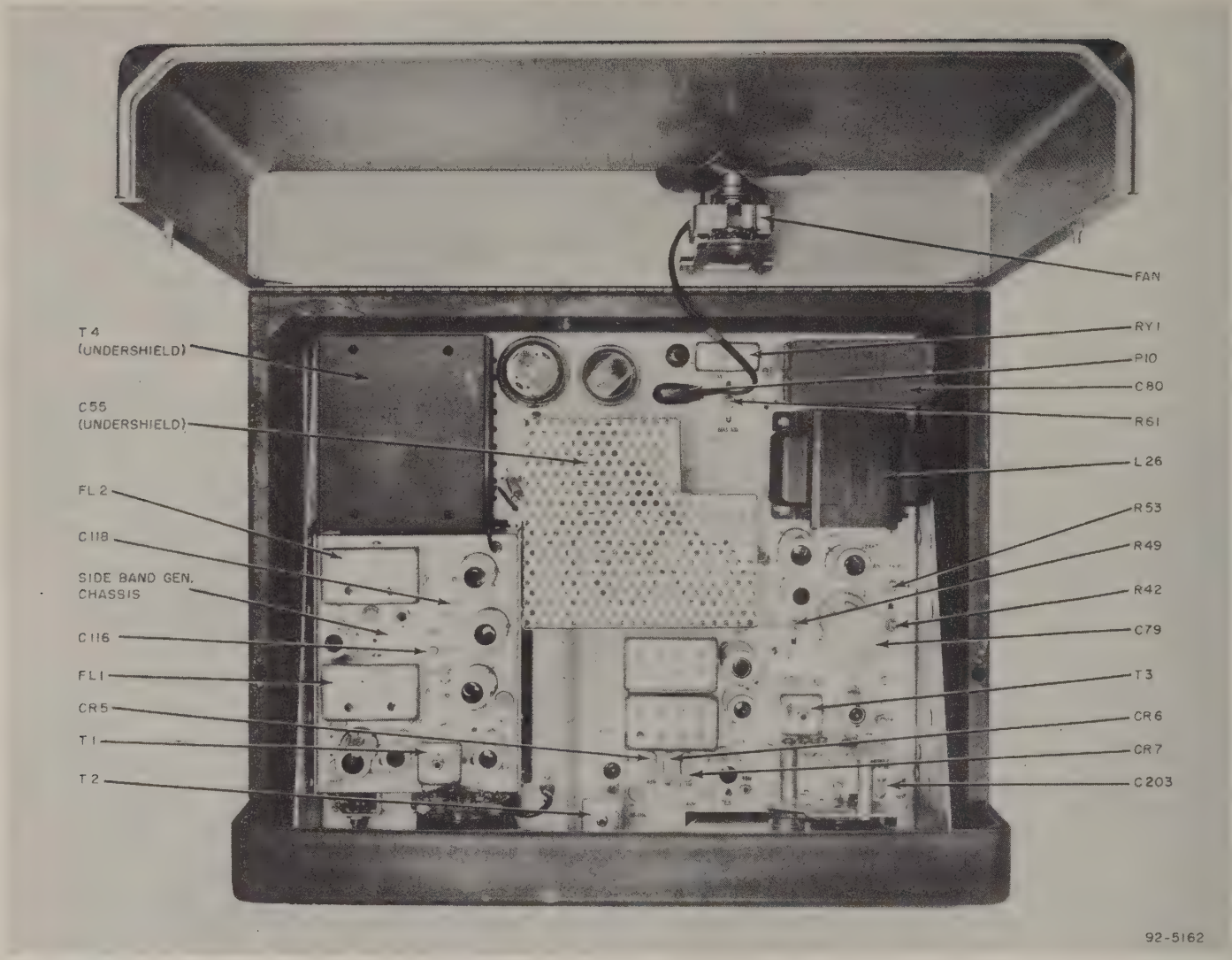


Figure 6. Top Chassis View

the spurious signal, turn the RF LEVEL control to zero or switch to upper or lower sideband position of the operation switch, and tune the DRIVER TUNE and FINAL TUNE for maximum output. Adjust the 10-11M trap trimmer for minimum output meter reading.

7. Re-check the 10-11M mixer trimmer setting by again tuning up on the desired frequency and peaking the trimmer, since the trap adjustment will affect the original mixer setting slightly.

4-8. USE OF VOX AND DELAY CONTROLS.

The VOX and DELAY controls are located on the top of the transmitter/exciter chassis as illustrated in Figure 6. Both controls are utilized in conjunction with VOX operation and are adjusted to provide control of the transmitter and station receiver.

1. The VOX control is an audio sensitivity control which determines the audio level which will trip (energize) the VOX RELAY, placing the transmitter/exciter "on the air". This control should be adjusted with the microphone at the normal speaking distance from the mouth. Advance the VOX control to a setting slightly above that which will "trip" the VOX RELAY. Excessive sensitivity will have the undesirable result of background noise "tripping" the VOX RELAY and placing the transmitter/exciter on the air. Note that the VOX sensitivity control and the AUDIO LEVEL control for the microphone are separate level adjustments, hence for example, backing off the AUDIO LEVEL control will not reduce the VOX sensitivity.

2. The DELAY control is in the grid circuit of the relay tube and determines the time lag in de-energizing the VOX RELAY when audio excitation is removed from the audio amplifier and VOX amplifier stages. This control should be advanced while speaking into the microphone and set at a position in which the time lapse between words will not de-energize the VOX RELAY. This adjustment will eliminate the constant keying of the transmitter/exciter at the beginning of each work when speaking. There is a slight interaction between the VOX and DELAY circuits, consequently, a slight re-adjustment of both controls may be necessary to obtain desired results.

4-9. USE OF ANTI-TRIP CONTROL.

This control is located on top of the transmitter/exciter chassis (Figure 6) and is used in conjunction with VOX operation. When the station receiver and speaker are connected for VOX operation (paragraph 3-1-5), the speaker ANTI-TRIP control is advanced to a setting where the audio signal picked up by the microphone from the receiver's speaker will not energize the VOX RELAY. This feature prevents the re-transmitting of the incoming audio signals from your station receiver. Note that an excessive speaker gain setting is capable of disabling the VOX relay completely, hence the minimum required gain should be used for best results

4-10. BIAS ADJ. CONTROL.

This control has been factory set for -49V as measured at the adjacent TEST terminal.

The control is located to the rear of the chassis and slightly to the right of center. (See Figure 6.)

An occasional check with an accurate, high resistance voltmeter will insure maximum tube life since the 6146 final amplifier tubes are operated close to rated plate dissipation for optimum performance.

To adjust the bias, set the OPERATION switch at MOX, FUNCTION switch at either sideband (zero signal) and adjust for -49V ±1V with the voltmeter connected between the test point terminal (-) and chassis (+). Note polarity since this is a bias voltage.

4-11. MODEL HT-32 WITH LINEAR POWER AMPLIFIER.

When the Model HT-32 Transmitter/Exciter is used to drive a linear amplifier, swamping or padding between the units may be required for optimum performance.

The degree of swamping or padding will depend upon the driving power required by the linear amplifier. High powered grounded grid or triode amplifiers generally will require little or no swamping since the driving power will be essentially equal to the power output capabilities of the HT-32. Linear power amplifiers using tetrodes or pentodes on the other hand generally require considerably less than the peak power output available from the HT-32.

In general the swamping between units should "soak" up the unused driving power so that the driver unit (HT-32) is running reasonably close to its peak power output and terminated in a 50-ohm load. This condition

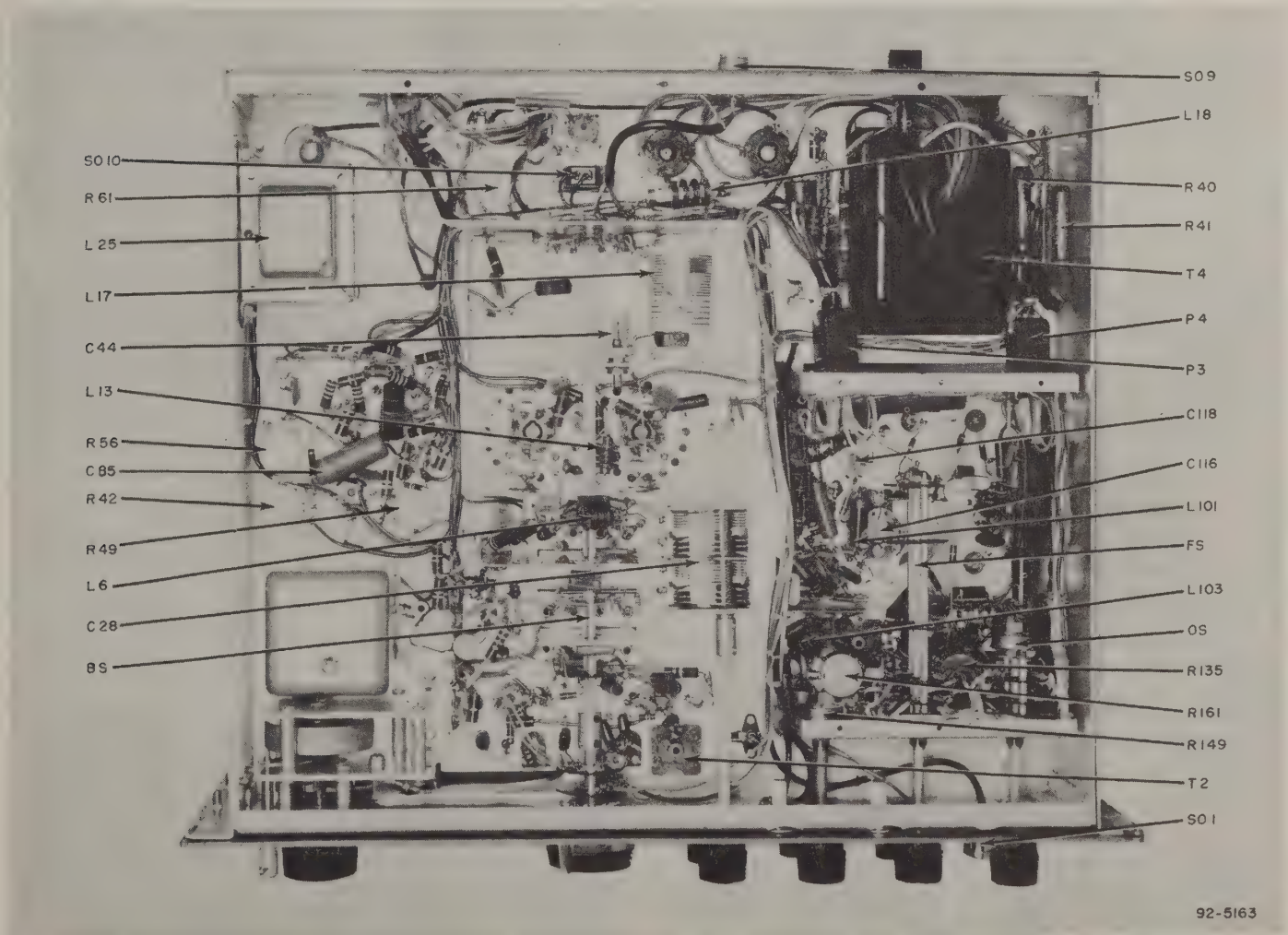


Figure 7. Bottom Chassis View

will retain the carrier suppression of the HT-32 for the overall system as well as hum and noise ratio which are all related to the peak envelope power output.

For example - Should the linear power amplifier require 40 to 50 watts of drive then a 3 db T pad designed for 50-ohm terminations would fully load the HT-32 while still transferring the required driving power to the final amplifier grids.

4-12. SERVICE OR OPERATING QUESTIONS.

For further information regarding operation or servicing of your Model HT-32 Transmitter/Exciter, write to:

General Service Manager
The Hallicrafters Co.
4401 West Fifth Ave.
Chicago 24, Illinois

Be sure to include the model, serial, mark number, and date purchased.

Make no service shipments to the factory unless instructed to do so by letter. The Hallicrafters Company will not accept the responsibility for unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



92X1401-C

SECTION V
SERVICE DATA

5-1. TECHNICAL SPECIFICATIONS.

TUBES ..... 17 plus 1 voltage regulator and 2 voltage rectifiers
POWER SOURCE.... 105-125 volts, 50/60 cycles AC
POWER OUTPUT:
SSB (PEP).....70-100 watts
CW.....70-100 watts
AM (CARRIER).....17-25 watts
AUDIO INPUT ..... 0.004V rms minimum
STABILITY..... 0.009 % maximum
HUM AND NOISE OUTPUT.....At least 40 db below carrier
UNWANTED BEAT OUTPUT ....At least 55 db below carrier
FREQUENCY COVERAGE..... 80, 40, 20, 15, 11, and 10 meter bands
FREQUENCY SELECTION ..... Self contained VFO
DIMENSIONS.....10-3/8" Height, 16" Deep, 20" Wide
SHIPPING WEIGHT .....85-1/4 lbs

5-2. CHASSIS REMOVAL.

The chassis and front panel assembly are removable as a unit from the cabinet by removing 2 screws at each side of the front panel and the 3 screws on the underside of the cabinet.

5-3. TUBE AND DIAL LAMP REPLACEMENT.

Access to the dial lamps and all tubes may be obtained by raising the top cover of the cabinet.

SECTION VI
BASIC OPERATING THEORY

6-1. BASIC OPERATING PRINCIPLES.

The basic operating principles of the Model HT-32 Transmitter/Exciter is explained in the following subparagraphs. Figure 10 is a block diagram of the transmitter/exciter and figure 12 is the schematic diagram. The complete system is first discussed for SSB operation and a brief description of CW and AM operation follows.

6-2. A. GENERAL DESCRIPTION.

Tube V1A is a 4.95 MC crystal controlled oscillator; its output frequency is ultimately converted to the desired operating frequency by heterodyne action in the succeeding stages. The output of V1A is a 4.95 MC signal which is fed directly to the tank circuit of the bridged-T modulator network. The audio input is impressed across diode modulator V14 which is part of the grounding leg of the bridged-T modulator network. The proper phase relation has been obtained by the CARRIER BALANCE controls.

In SSB operation, (FUNCTION switch in UPPER SB or LOWER SB position), the bridged-T modulator network is placed in a balanced condition and carrier output is at least 50 db below peak envelope power. Under balanced conditions, the output of the bridged-T modulator network consists of the upper and lower sideband of 4.95 mc. A filter system, in the input and output circuits of the sideband filter amplifier stage, V2, suppresses the lower sideband of the modulated 4.95 mc signal. The upper sideband is fed to the 1st mixer, V3, where it is combined with 4.05 mc or 13.95 mc, as selected, from V4. The oscillator frequency used

determines whether the upper or lower sideband is transmitted. For example:

1. Upper sideband - the upper sideband of 4.95 mc is mixed (sum) with 4.05 mc to obtain the upper sideband at 9 mc. The inter-stage coupling between 1st mixer, V3; 9 mc amplifier, V5; and 2nd mixer, V7 consists of tuned transformers T1 and T2 which pass only a band of frequencies near 9 mc.

2. Lower sideband - the upper sideband of 4.95 mc is mixed with 13.95 mc to obtain the lower sideband at 9 mc. As in the upper sideband condition, the inter-stage coupling of V3, V5, and V7 pass only the frequencies near 9 mc.

Up to the input stage of 2nd mixer, V7, the operation of the HT-32 Transmitter/Exciter is identical on all bands. The remaining stages "beat" (sum or difference) the selected 9 mc sideband to the desired operating frequency. Frequency multiplication cannot be used since doubling the frequency would double the spacing of the sidebands. This would change the relative frequency of the modulating frequencies when the signal is detected.

6-3. B. 80 METER OPERATION.

The selected sideband (upper or lower) at 9 mc is amplified by 9 mc amplifier, V5, and fed to the 2nd mixer V7. On 80 meters, heterodyne oscillator, V6, has no output and the 2nd mixer, V7, functions as an additional amplifier. At the 3rd mixer, V8, the sideband is mixed (difference) with the output frequency of the VFO, V9. Since the VFO output frequency is tunable from 5.0 to 5.5 mc, the difference output of V8 is the sideband of a frequency between 3.500 to 4.000 mc.

6-4. C. 40 METER OPERATION.

The selected sideband at 9 mc is mixed (difference) with a 21.5 mc output of heterodyne oscillator V6 in 2nd mixer, V7. The output of V7 is a sideband at 12.5 mc which is applied to the 3rd mixer, V8. In this stage, the signal is mixed (difference) with the VFO output (5.0 to 5.5 mc); the resulting signal is the sideband of a frequency between 7.000 to 7.500 mc.

6-5. D. 20 METER OPERATION.

Operation on 20 meters is essentially the same as 80 meters except that "sum" mixing is employed in place of "difference" mixing at 3rd mixer, V8. When the VFO output (5.0 to 5.5 mc) is mixed with the upper or lower sideband at 9 mc, the resulting signal is the sideband of a frequency between 14.000 mc to 14.5 mc.

6-6. E. 15 METER OPERATION.

The selected sideband (upper or lower) at 9 mc is mixed (difference) at 2nd mixer, V7, with a 25 mc signal from heterodyne oscillator V6; the output of V7 is a sideband of a 16 mc signal. This signal is applied to 3rd mixer, V8, where it is mixed (sum) with the 5.0 mc to 5.5 mc output of the VFO, V9. The result of the mixing action is a sideband of a frequency from 21.0 mc to 21.5 mc.

6-7. F. 11 METER OPERATION.

For 11 meter operation the "upper" or "lower" sideband at 9 mc is mixed (difference) at 2nd mixer, V7, with a 30.9 mc output signal of heterodyne oscillator, V6. The resulting signal, a sideband at 21.9 mc, is again mixed at 3rd mixer, V8, with the VFO output signal (5.0 to 5.5 mc). The output of V8 is then a sideband of a frequency from 26.9 mc to 27.4 mc.

6-8. G. 10 METER OPERATION.

Four distinct ranges are provided for complete coverage of the 10 meter band. Each range utilizes a separate frequency from the heterodyne oscillator, V6. The operation in the four ranges is as follows:

1. 28 mc to 28.5 mc. - The selected sideband at 9 mc is mixed (difference) at 2nd mixer, V7, with a 32.0 mc signal from heterodyne oscillator V6. The resulting signal, a sideband at 23.0 mc is applied to 3rd mixer, V8. In this stage, the sideband at 23.0 mc is mixed (sum) with the VFO output (5.0 mc to 5.5 mc). The resulting signal is a sideband at a frequency between 28.0 mc to 28.5 mc.

2. 28.5 mc to 29 mc. - For this range, the 9 mc sideband is mixed (difference) with the 32.5 mc signal from heterodyne oscillator V6, in 2nd mixer V7. The resulting signal, a sideband at 23.5 mc, is mixed (sum) in the 3rd mixer, V8, with the 5.0 mc to 5.5 mc output of the VFO. The output of V8 is a sideband at a frequency between 28.5 mc to 29 mc.

3. 29 mc to 29.5 mc. - As in the above two ranges, the selected sideband of the 9 mc signal from V5 is applied to 2nd mixer, V7. Here it is mixed (difference) with the 33 mc output of V6. The output of V7 is a sideband at 24 mc. This signal is mixed (sum) in 3rd mixer, V8, with the VFO output. The resulting signal is a selected sideband at a frequency between 29 mc to 29.5 mc.

4. 29.5 mc to 30 mc. - For operation in this range, the heterodyne oscillator, V6, injects a 33.5 mc signal in V7 and is mixed (difference) with the selected sideband at 9 mc. The resulting frequency, a sideband at 24.5 mc is mixed (sum) in V8 with the 5.0 mc to 5.5 mc output of the VFO. The output of V8 is a sideband at a frequency between 29.5 mc to 30 mc.

6-9. CW OPERATION.

When the FUNCTION control is set to CW or DSB position it unbalances the "bridged-T" modulator network, allowing a carrier to be amplified and heterodyned to the desired output frequency. Two sections of the FUNCTION switch bypasses the 4.95 mc filter (V2 and associated circuitry) in the "CW" or "DSB" position. With these exceptions, CW operation is the same as SSB operation.

6-10. DSB (AM) OPERATION.

As in CW operation, the carrier frequency is present in the signal and the 4.95 mc filter is bypassed. Amplitude modulation of the carrier occurs across diode modulator V14. The resulting signal is amplified and heterodyned as in CW and SSB operation.

SECTION VII

HT-32 SERVICE AND ALIGNMENT PROCEDURES

(Figures 8 and 9 Cover These Procedures)

7-1. EQUIPMENT REQUIRED.

1. RF Signal Generator — Measurements Corp. Model 65B or equivalent having a 1V RMS output at an impedance of 70 OHMS or less. (A 100 mmf DC blocking capacitor must be placed in series with the RF lead.)

2. Vacuum tube voltmeter (VTVM) — Hewlett Packard 410A or equivalent having an RF probe good to 35 MC.

3. Dummy load — 50 ohms non-inductive, rated at 100 watts. The dummy load may be made up of carbon resistors, Bird Wattmeter, or equivalent.

4. DC Milliammeter 0 - 300 MA DC.

5. Oscilloscope — with external vertical plate connection.

6. Receiver (3-30 MC range) with 50 KC calibrator.

7-2. INITIAL CONTROL SETTINGS.

OPERATION..... STANDBY (Power on)
FUNCTION..... DSB
CALIBRATE LEVEL 0
DRIVER TUNING.....Fully counterclockwise (Closed gang)
FINAL TUNING .....ON INDEX (Closed gang)
FREQUENCY .....Fully counterclockwise (Closed gang)
BAND SELECTOR..... As instructed
AUDIO LEVEL.....0
METER COMPRESSION.....10
RF LEVEL.....0

7-3. BIAS ADJUSTMENT.

Check the bias voltage before running any extensive checks with the plate and screen voltage applied to the 6146 final amplifier tubes. Set BIAS ADJ. for -49V DC ±1V with the OPERATION switch at MOX., FUNCTION switch at either upper or lower sideband (zero signal). Line voltage 117V.

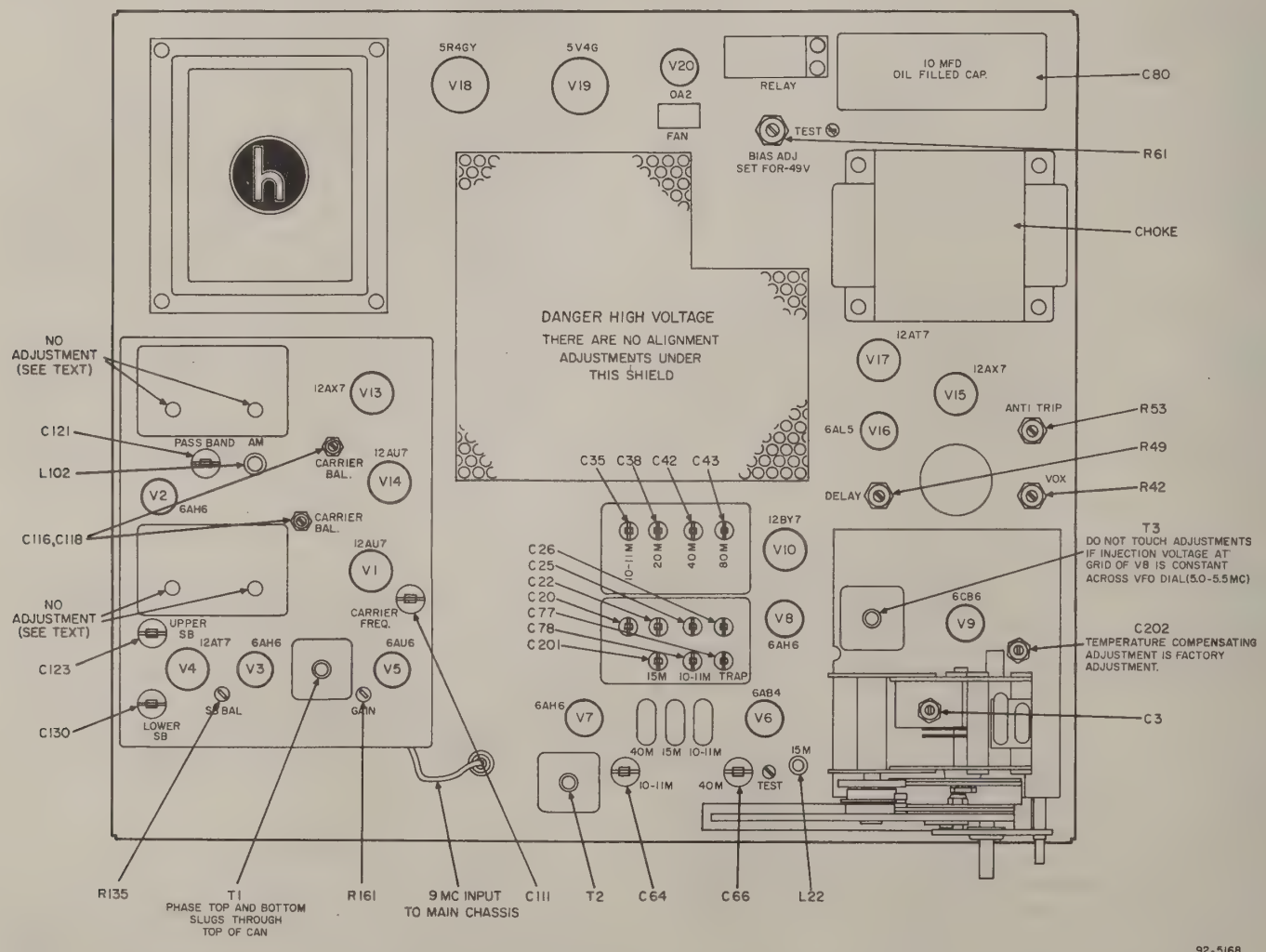


Figure 8. Top Chassis Alignment Points

7-4. RF ALIGNMENT 2ND AND 3RD MIXER AND DRIVER STAGES.

IMPORTANT: The RF alignment should only be attempted when a transmitter-exciter malfunction has been analyzed and definitely traced to RF mis-alignment.

Remove 21.5, 25, and 32.5 MC xtals, Osc. Tube V9; HV Rect V18; and 9 MC RF cable from SB generator. Disconnect screen lead of V11 (6146, Final Amp) from lug — of terminal board on underside of chassis. Set neutralization capacitor C44 and VFO coupling capacitor C15 at mid-capacity, if this is to be a complete alignment.

To place the transmitter in operation for alignment, set OPERATION control at MOX. This places operating bias on the 3rd mixer and driver stages.

7-5. 3RD MIXER AND DRIVER STAGES.

ALIGNMENT CHART

Step	Band	Signal Generator Connection	VTVM Connection	Trimmer Adjust for Maximum	Coil Adjust for Maximum	Signal Generator Freq. MC		Approx. Driver Tuning Setting	
						f_1	f_2	D_1	D_2
1	80M	High Side to Pin #1 grid of V8 (6AH6, 3rd Mixer) Common side to chassis. (Generator leads must be kept to absolute minimum to prevent regeneration.)	VTVM to Pin #5 grid of V11 (6146 Final Amp). Common to chassis.	C26 C43	L7 L11	3.5	4.0	1.3	3.7
2	40M	Same as step 1.	Same as step 1.	C25 C42	L6 L10	7.0	7.3	0.9	4.1
3	20M	Same as step 1.	Same as step 1.	C22 C38	L5 L9	14.0	14.35	1.5	3.6
4	15M	Same as step 1.	Same as step 1.		L5 L9	21.0		2.1	
5	11-10M	Same as step 1.	Same as step 1.	C20 C35	L4 L8	26.9	29.7	0.3	4.6

7-6. ALIGNMENT PROCEDURE.

1. The 3rd mixer and driver stages alignment procedure for 80, 40, 20 and 11-10 meter bands, is essentially the same, differences being only in frequency used and adjustment location which can be obtained from the chart above. The following is the alignment procedure for 80 meters. Preset the Initial Control Settings with the BAND SELECTOR set on the band being aligned (80M).

   (a) Set trimmers (C26 and C43) to mid-capacity.

   (b) Preset slugs (L7 and L11) to their maximum inductance) if they have never been previously aligned.

   (c) Set the DRIVER TUNING to D_1 (1.5 on Knob).

   (d) Set the R.F. Generator to f_1 (3.5 MC) using sufficient generator output to obtain a readable indication on the VTVM. If 1V out of the signal generator does not provide a VTVM reading proceed with slug adjustment below.

   (e) Carefully adjust each slug (L7 and L11) for maximum deflection on VTVM. Use reference voltage on VTVM of approximately 20V RMS.

   (f) Adjust the output frequency of the R.F. generator to f_2 (4.0 MC) using sufficient generator output to obtain about 20V RMS at the grid.

   (g) Tune DRIVER TUNING for maximum deflection on VTVM. Driver tuning setting should be approximately D_2 (3.7 on the Knob).

   (h) Adjust trimmers (C26 and C43) for maximum deflection on VTVM.

   (i) Repeat steps (c) thru (h) until the adjustments result in no appreciable increase in grid voltage. The band is then correctly tracking with maximum output.

2. The 3rd Mixer and Driver Alignment procedure for 15M is slightly different, since the 20M and 15M bands share the same coil. The following is the alignment procedure for 15 meters.

   (a) Align 20 meter band as outlined above.

   (b) Set BAND SELECTOR at 15M.

   (c) Set the R.F. generator at f_1 (21.0 MC) using sufficient generator output to obtain about 20V RMS at the grid of the final amplifier.

(d) Tune DRIVER TUNING for maximum deflection of VTVM. Driver tuning setting should be approximately D. (2.1 on the knob)

(e) Adjust slugs (L5 and L9) for maximum deflection of VTVM. If additional, gain is obtained with this adjustment, repeat 20 meter trimmer alignment at 14.35 MC and check 14.0 MC for uniform gain on 20M band.

(f) Repeat above procedure until no further gain can be obtained on both bands.

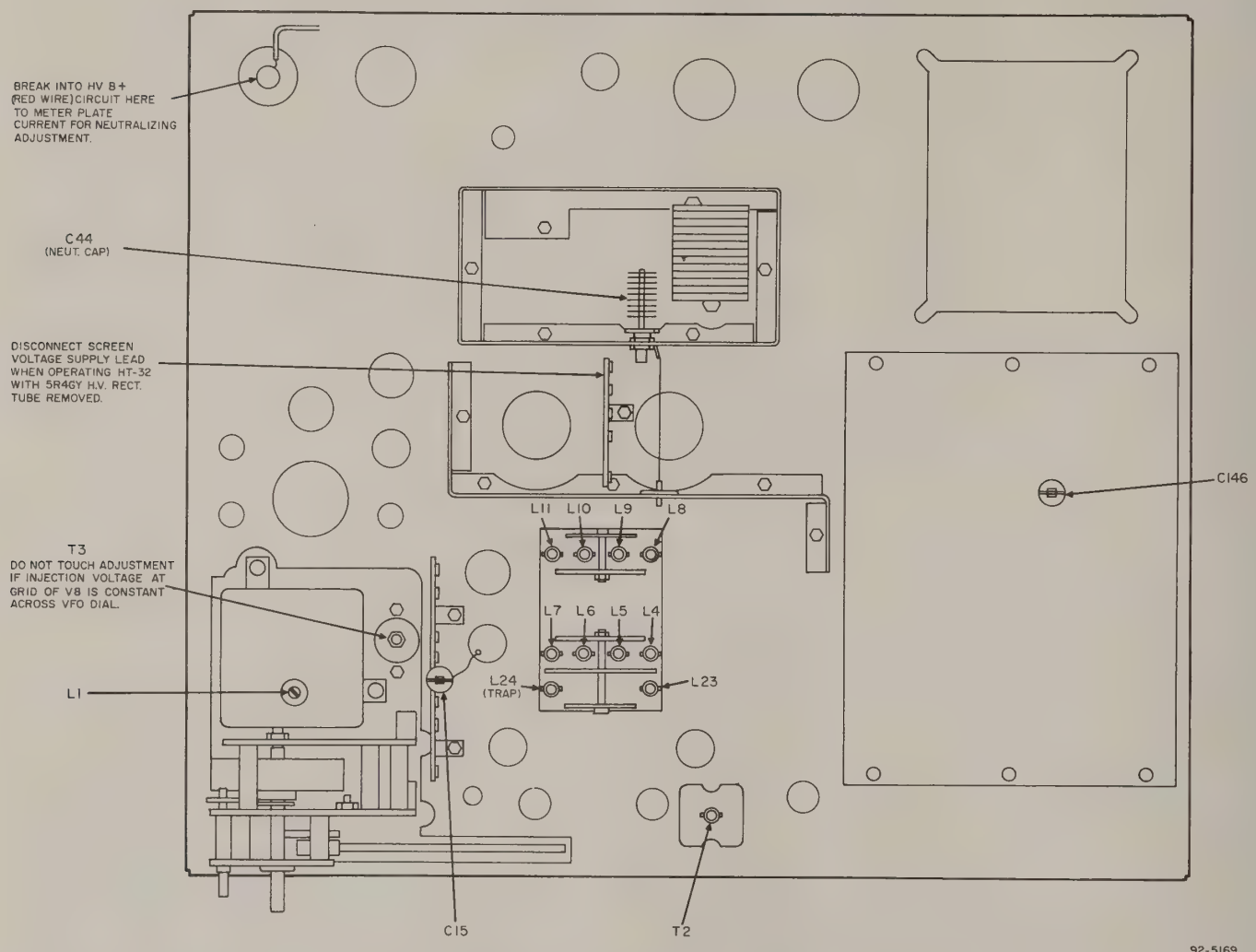


Figure 9. Bottom Chassis Alignment Points

7-7. 2ND MIXER STAGE

ALIGNMENT CHART								
Step	Band	Signal Generator Connection	VTVM Connection	Trimmer Adjust for Maximum	Slug Adjust for Maximum	Signal Generator Freq. (MC)		VFO Freq. (MC)
						f_1	f_2	
1	40M	High side to pin #1 grid of V7 (6AH6, 2nd Mixer). Common side to chassis.	VTVM to pin #5 grid of V11 (6146, Final Amp.). Common to chassis.		L23	7.2	12.5	7.2
2	15M	Same as step 1.	Same as step 1.	C201		21.0	16.0	21.0
3	11-	Same as step 1.	Same as step 1.	C78		29.5	24.0	29.5

7-8. ALIGNMENT PROCEDURE.

The 2nd mixer alignment procedure must follow the sequences shown in the chart, since the setting of the coil inductance on 40M must precede the trimmer adjustments on 15M and 10-11M bands. The following is the alignment procedure for 40 meters.

1. Set BAND SELECTOR at 40M.
2. Set trimmers C201 and C78 at mid-capacity.
3. Set slug (L23) at it's maximum counterclockwise position (minimum inductance).
4. Set Signal generator at f_1 (7.2 MC) with sufficient output to permit setting the driver tuning to resonance.
5. Adjust DRIVER TUNING for maximum deflection on VTVM.
6. Set BFO dial to 7.2 MC.
7. Set R.F. generator at f_2 (12.5 MC). Set generator output for approximately 20V RMS at the final grid while making alignment adjustments.
8. Adjust mixer coil slug L23 for maximum deflection on VTVM.
9. Proceed with the alignment of the 2nd mixer stage on 15M and 10-11M using the chart and the above procedures used on 40M.

NOTE

The above alignment data for 10-11M 2nd mixer adjustment covers the 28.5-29.0 MC 10M segment (32.5 MC xtal) supplied with the HT-32 Transmitter/Exciter. For alignment instructions covering the use of other 11M or 10M 0.5 MC segments, refer to SEGMENT ALIGNMENT for 10-11M BAND in paragraph 4-7.

The 2nd mixer plate frequency (f_2) for the various crystals used on the 10-11M band are as follows:

Trans. freq. range	Xtal freq.	2nd Mixer freq. (f_2)
26.9 - 27.4 MC	30.9 MC	21.9 MC
28.0 - 28.5 MC	32.0 MC	23.0 MC
28.5 - 29.0 MC	32.5 MC	23.5 MC
29.0 - 29.5 MC	33.0 MC	24.0 MC
29.5 - 30.0 MC	33.5 MC	24.5 MC

7-9. HETERODYNE XTAL OSCILLATOR ALIGNMENT

ALIGNMENT CHART

Step	Band Selector	VTVM Connection	Trimmer Adjustment	Coil Adjustment	Injection Level
1	15M	VTVM to pin #1 of V7 (6AH6, 2nd Mixer). Common side to chassis.		L22	0.25V RMS
2	40M	VTVM to pin #1 of V7 (6AH6, 2nd Mixer). Common side to chassis.	C66		0.5 V RMS
3	11-10M	VTVM to pin #1 of V7 (6AH6, 2nd Mixer). Common side to chassis.	C64		0.5 V RMS

7-10. ALIGNMENT PROCEDURE.

The heterodyne crystal oscillator alignment procedure must follow the sequence shown in the chart, since the setting of the coil inductance on 15M must precede the trimmer adjustments on 40M and 10-11M bands.

1. Set BAND SELECTOR at 15M.
2. Adjust Xtal Osc coil slug (L22) for 0.25V RMS on the gentle slope side of resonance.
3. Set BAND SELECTOR at 40M.
4. Adjust Xtal Osc trimmer C66 for 0.5V RMS on the gentle slope side of resonance.
5. Set BAND SELECTOR at 11-10M.
6. Adjust Xtal Osc trimmer C64 for 0.5V RMS on the gentle slope side of resonance.

7-11. VFO CALIBRATION ALIGNMENT.

The VFO unit has been carefully aligned and temperature compensated at the factory. Before touching up trimmer C3 or coil L1 check the dial calibration at the 100KC points. If all points fall to one side of the pointer, reset the pointer position. If, the calibration "runs out" across the dial proceed as follows:

1. Set OPERATION control at STANDBY.

2. Place the antenna lead of the receiver near the VFO unit and set the receiver at 5.0 MC with the 50 KC calibrator. Receiver BFO turned off.

3. Tune the VFO unit to 4000 kc on 80M.

4. Adjust slug L1 for zero-beat.

5. Set the receiver to 5.5 MC with the 50 DC calibrator at zero beat.

6. Tune the VFO unit to 3500 kc on 80M.

7. Adjust air trimmer C3 for zero beat.

8. Repeat steps 2, 3, 4, 5, 6, and 7 until calibration is obtained at either end of the dial scale.

7-12. RF ALIGNMENT 9 MC AMPLIFIER STAGES.

Signal Generator Connection	Signal Generator Frequency	VTVM Connection	Control Setting	Remarks
High Side to Pin #1 Grid of V3 (6AH6, 1st Mixer) Common to chassis	9 MC (Unmod.)	VTVM RF probe to pin #5 Plate of V7 (6AH6, 2nd Mixer.) Common side to chassis	BAND SELECTOR, 20M. OPERATION, Standby. RF LEVEL, 10. (All other controls at initial control setting.)	Remove OSC. tubes V1, V4. Peak upper and lower core adjustments of T1 and T2 for maximum deflection of VTVM. (1V RMS)

7-13. CARRIER OSC. AND SIDEBAND SWITCHING OSC. ALIGNMENT.

The carrier oscillator and sideband switching oscillators are provided with minor frequency correction trimmers which permit setting each oscillator to exact frequency. The object of the oscillator frequency adjustment in the sideband generator unit is to provide a carrier signal frequency of exactly 9000 kc. This is accomplished by heterodyning the carrier oscillator frequency (4950 kc) with either the 4050 kc or 13,950 kc sideband switching oscillator to produce a 9000 kc signal at the output of the sideband unit.

7-14. CARRIER OSCILLATOR

Ordinarily the carrier oscillator will not require adjustment in the field. If the 9 MC signal is not on frequency, adjust the sideband switching oscillators only. In cases where the carrier oscillator frequency must be set, proceed as follows:

1. Set the OPERATION switch at the MOX position.

2. Set the FUNCTION switch at DSB.

3. Tune up the transmitter on 80M into a dummy load.

4. Reset the FUNCTION switch for either USB or LSB.

5. Set the two CARRIER BAL. trimmers on the sideband unit for maximum carrier level and if necessary detune with the DRIVER TUNE control to prevent over-driving the final.

6. Adjust the CARRIER FREQ. trimmer (C-111) for maximum carrier level, again detuning with the DRIVER TUNE control to prevent driving the final stage into a saturation output.

7. Set the carrier level with the DRIVER TUNE control for 50V RMS across the dummy load, or use the output meter on the transmitter taking care to avoid driving the final into the saturation level. Set the output meter sensitivity for zero db.

8. Decrease the carrier oscillator frequency by turning the CARRIER FREQ. trimmer until the carrier level drops 20 db to 30 db.

NOTE. The carrier oscillator frequency may not fall exactly on 4950 kc which is stated in the manual as the nominal frequency.

9. Rebalance for maximum carrier suppression with the carrier balance trimmers. Return the driver stage and check the low frequency audio response. Use a 50V RMS RF output level at 1000 CPS audio reference frequency. The low frequency response for -3 db will fall between 500 CPS and 650 CPS.

NOTE. The low frequency audio response is directly governed by the CARRIER OSCILLATOR frequency. The carrier frequency is set in this manner to insure carrier suppression of 40 db or more after a 30 minute warm-up.

10. Check the audio frequency response at the high end of the range. The output level should fall -3 db at 3000 to 4000 CPS. If adjustment is required, adjust the AM coil (L-102) for the correct response.

NOTE. A change in the AM coil adjustment will generally require an adjustment of trimmer C-146, in order to repeak the carrier level output for DSB or CW operation.

11. After the carrier frequency has been set, it is now necessary to adjust the sideband switching

oscillators for exactly 9000 kc from the sideband unit as described in para. 7-15.

7-15. SIDEBAND SWITCHING OSCILLATORS.

1. Set band switch at 80M.
2. Disconnect shielded cable from sideband unit at main chassis connector.
3. Place antenna lead of receiver near the center terminal of the shielded plug and set the receiver at 9000 kc.
4. Set the FUNCTION switch at LSB.
5. Adjust LOWER SB osc. trimmer (C130) for zero beat.
6. Set the FUNCTION switch at USB.
7. Adjust UPPER SB osc. trimmer (C123) for zero beat.

7-16. SIDEBAND BALANCE ADJUSTMENT.

The SB BAL control is a potentiometer (R-135) in the cathode circuits of the 4.05 MC oscillator and 13.95 MC oscillator (V4) stages. This control is utilized to maintain sideband amplitude symmetry and may not require adjustment throughout the use of the transmitter-exciter. However, if adjustment is necessary, proceed as follows:

1. Tune the transmitter-exciter for DSB operation.
2. Set the FUNCTION switch at "UPPER SIDEBAND" and note the reading of the front panel meter. Set RF LEVEL control for approximately mid-scale reading.
3. Set the FUNCTION switch at "Lower Sideband". The meter indication for both "UPPER" and "LOWER SIDEBAND" should be essentially the same. Any difference in output between the 4.05 MC oscillator and 13.95 MC oscillator can be compensated by adjusting the SB BAL control. Rotating the SB BAL control will increase the output of one sideband and decrease the other simultaneously. Consequently, it is necessary to alternate between the "UPPER" and "LOWER SIDEBAND" positions of the FUNCTION switch, checking for equal output, while adjusting the SB BAL control.
4. There is a slight interaction between the SB BAL adjustment and SB frequency adjustment, hence a relatively large change in one will effect the performance of the other. If a large correction in sideband balance is required, check the sideband switching oscillator frequency adjustment again.

7-17. NEUTRALIZATION OF FINAL AMPLIFIER.

Although a signal generator is used here for this adjustment, the carrier on DSB or CW generated by the transmitter may be used on the 10M and 15M bands.

1. Connect signal generator to pin #1 of V7 (2nd mixer) through 100 uuf capacitor. Common side to chassis.
2. Connect dummy load to transmitter output.
3. Remove heterodyne oscillator tube (V6) and 9 MC output cable from sideband generator unit.
4. Connect 0-300 MA milliammeter in H.V. plate lead between the filter capacitor (C80) and shunt feed choke (L16).
5. Insert HV rectifier and reconnect screen supply lead.
6. Set neutralizing capacitor at mid-capacity.
7. Set OPERATION switch at MOX. and frequency dial at mid position.
8. Set BANDSWITCH at 10-11M, signal generator at 23 MC and adjust DRIVER and FINAL TUNING for maximum output. Set signal generator output for 150-175 ma plate current.
9. Tune FINAL TUNE control for plate current dip and observe output meter. Adjust neutralization capacitor until the output meter passes through maximum at the same time the plate current passes through the resonant dip.
10. Set BANDSWITCH at 15M, signal generator at 16 MC and repeat the above procedure.
11. If the neutralization capacitor setting does not change, the adjustment is complete. If a small change in setting occurs, set the capacitor half way between the two settings and recheck with this compromise setting.

7-18. CARRIER BALANCE ALIGNMENT.

The CARRIER BAL C116 and C118 are air trimmers located at the top side of the sideband generator unit. The adjustment of trimmer C116 tunes the Bridged T coil to resonance and the adjustment of trimmer C118 adjusts the phase of the Bridged T network so that the carrier frequency is balanced out, when operating in either side band position of the FUNCTION switch. The best working carrier balance adjustment will be obtained if adjustment is made after the transmitter has reached a normal operating temperature, which is usually in about 2 to 3 hours.

1. Tune the transmitter-exciter for DSB operation.
2. Set FUNCTION switch to one sideband position.
3. Adjust C116 and C118 systematically for maximum carrier suppression. (Minimum output meter reading.)
4. Set FUNCTION switch to the other sideband position.
5. Re-adjust C116 and C118 until the maximum carrier suppression is equalized in both sideband positions.

7-19. VFO INJECTION ADJUSTMENT.

This adjustment is a coupling trimmer in the output of the VFO unit which governs the amount of VFO injection voltage applied to the 3rd mixer stage.

1. Set BAND SELECTOR at 15M.
2. Set VFO dial to 21.33 MC.
3. Tune the transmitter-exciter for DSB operation into 50-ohm load.
4. Disconnect 9 MC cable input from SB generator.
5. Adjust VFO coupling trimmer (C15) for 0.1 RMS RF output across 50 ohms.
6. Connect VTVM probe to pin #1 grid of V8 (6AH6, 3rd Mixer). The injection voltage will be approximately 0.3 to 0.4V RMS. If below 0.3V check screen and bias voltages on tubes V8 and V10 and check tubes V8 and V10 for malfunction.
7. Replace 9 MC cable input from SB generator and tune for maximum saturated power output, which should be at least 60V RMS across 50 ohm load.

7-20. 10 METER TRAP COIL ADJUSTMENT.

This adjustment should be done with a 33.5 MC crystal in the 11-10M heterodyne osc. xtal socket. However, if operation between 29.5 - 29.7 MC is not contemplated and no 33.5 MC xtal is available, the 33 MC xtal can be used.

PROCEDURE.

1. Preset the trap trimmer (C-77) to minimum capacity (slot toward center of RF deck). See Figure 5.
2. Preset the trap coil slug (L-24) for minimum inductance (maximum counterclockwise).
3. Tune the transmitter for CW operation on the 10M band.
4. Set the FUNCTION switch at LSB.
5. Adjust DRIVER TUNING and FINAL TUNING for the spurious output. (33.5 MC Xtal - VFO frequency = 28.0 to 28.5 MC.)
6. Adjust trap coil slug L-24 for minimum output.
7. Increase trap trimmer capacity slightly, and reset the trap coil slug for minimum output. Use just enough capacity in the trap trimmer to observe two resonant dips in the spurious output when the trimmer is rotated through minimum capacity.
8. Set FUNCTION switch at DSB.
9. Tune DRIVER TUNING and FINAL TUNING to desired frequency between 29.5 - 29.7 MC.
10. Readjust 10-11M 2nd mixer trimmer (C-78) for maximum output with RF LEVEL slightly advanced.
11. Set FUNCTION switch at LSB.
12. Retune DRIVER TUNING and FINAL TUNING for spurious output.
13. Adjust trap coil slug for minimum spurious output and repeat step 10 to be sure the mixer stage is resonant.
14. When crystals other than the 33.5 MC crystals are now used on the 10M band, it is only necessary to adjust the trap trimmer. The trap coil adjustment is left as adjusted for the highest frequency crystal.

7-21. 9 MC GAIN ADJUSTMENT ON SIDEBAND UNIT.

This control (R-161) is located on the sideband generator unit and is accessible at the top of its chassis. The control sets the gain of the 9 MC amplifier and is considered a factory adjustment which will generally not require readjustment unless extensive service work has been done on the equipment.

Before changing the adjustment, check the performance of the transmitter as follows:

1. Tune up the transmitter on single sideband using a dummy load. With a 1000 cps audio oscillator, measure the audio signal level at the microphone connector for peak or saturation power output on each of the bands.
2. The audio signal level at the microphone input should run between 2 to 4 millivolts rms for saturation or peak power output. Should any one band require substantially more audio signal level than the rest, re-check the alignment on that band.
3. If the audio level required is uniformly higher on all bands, advance the 9 MC amplifier gain adjustment to bring it into agreement with the level specified in step 2. If the audio level required runs less than 2 millivolts, the gain is excessively high and will not permit the carrier suppression and unwanted sideband to reach 50 db below maximum output. In this case reduce the gain setting accordingly.

7-22. CRYSTAL FILTER ALIGNMENT.

Due to the specialized techniques and test equipment required it is recommended that realignment of the filter units (FL1 and FL2) be handled through the company service department. The operation of the filter can be checked out as follows to determine whether the filter requires realignment.

1. Tune up the transmitter for single sideband operation into a 50-ohm load.
2. With a 1000 cps audio generator, adjust the transmitter output for zero db reference on the output meter with the METER COMPRESSION set for maximum meter sensitivity. This will permit operating the transmitter well below the saturation output level.
3. Hold the generator output voltage constant and check the transmitter output at 650 cps and 3000 cps. The transmitter output should not drop below approximately 3 db at these extremes of the audio passband. If the transmitter output vs frequency is tilted, the correction may be made by adjusting the PASSBAND trimmer (C-121) located on the top deck of the sideband unit.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number

CAPACITORS (MAIN CHASSIS)

C-1	Ceramic, 12 mmf ±5% N1500 250 PPM	47D20V120J
C-2	Ceramic, 12 mmf ±5% NPO ±30 PPM	47X20CG120J
C-3	Variable, trimmer 2.6-13.3	48-376
C-4	Tubular ceramic, 18 mmf 5% N80 30 PPM	47X20LG180J
C-5, 6	Mica, 1000 mmf 5% 300V (.001)	47A623
C-7, 9	Mica, .01 mfd 10% 300V	47X40E103K
C-8, 10, 51, 52, 60, 61, 84, 86, 87, 88	Ceramic disc, .01 mfd 500V (.01)	47-224
C-11	Ceramic, 6 mmf 10% NPO	47X20CG060K
C-12, 14	Part of T3(47)	
C-13	Part of T3 (470)	
C-15	Trimmer 1.5-7 mmf	44A457
C-16, 30	Ceramic, 47 mmf N750 10%	47X20UK470K/D
C-17, 18, 29, 31, 32, 37, 46, 47, 48, 49, 50, 62, 63, 72, 73, 90, 91, 92, 93, 94, 95, 96, 97	Ceramic, .005 mfd 20%	47A442
C-19, 75	Ceramic disc, .005 1 KV 20%	47A523
C-20, 22, 25, 26, 35, 38, 42, 43	Trimmer strip (4 section) 5-25 mmf NPO	44B464
C-21, 36	Fixed ceramic, 110 mmf 2%	47X32SH111G/D
C-23, 39	Fixed ceramic, 82 mmf 5%	47X25RH820J/D
C-24, 41	Mica, 240 mmf 2%	47X20D241G
C-27	Fixed ceramic, 47 mmf 2%	47X25CG470G
C-28	Variable, Driver tuning	48D381
C-33	Ceramic fixed, 33 mmf 2%	47X25CG330G
C-34	Ceramic disc, .0027 20% 1 KV	47B524
C-40	Mica, F.T. 2000 mmf	47B669
C-44	Variable, 2-13 mmf	48B316
C-45	Ceramic, 100 mmf N750 10%	47X25UK101K/D
C-53, 54	Ceramic disc, .001 3000V	47A397
C-55	Variable, Air, Final Tune	48D386
C-56	Toothpick, 380 mmf	47A668
C-57	Toothpick, 220 mmf	47-596
C-58, 59	Fixed, 270 mmf 2%	47X20C271G
C-64	Trimmer, 5-25 mmf	44A473
C-65	Ceramic tubular, 39 mmf 2% NPO	47X25CG390G/D
C-66	Trimmer, 8-50 mmf N750	44B437
C-67	Ceramic tubular, 43 mmf 5% N750	47X20UK430J/D
C-68	Ceramic, 5 mmf N750 10%	47X20UK050K/D
C-69, 70	Part of T2 (56 uuf)	
C-71	Ceramic tubular, 68 mmf 2% N30 30 PPM	47X32HG680G
C-74	Mica, 200 mmf 2%	47X20D201G
C-76	Fixed ceramic, 68 mmf 5% N220	47X25RH680J/D
C-77, 78	Ceramic trimmer strip, 3 section	44B474
C-79A, 79B	Electrolytic, 60-40 mfd 475V	45B226
C-80	Oil filled, 10 mfd 1000V	46C638
C-81, 82	Ceramic disc, .01-1 KV	47B598
C-83	Molded paper, .01 mfd 600V.	46BR103L6
C-85	Molded paper, .22 mfd 200V.	46BR224L2
C-89	Molded paper, .1 mfd 200V	46BR104L2
C-98, 99	Electrolytic, 10 mfd 150V	45B307
C-201	Ceramic trimmer strip, 3 section	44B474
C-202	Variable, Air, trimmer, differential	48-375
C-203	Variable, Frequency (main tuning) 9.5-22.5	48C343

CAPACITORS (SIDEBAND GEN. ASSEMBLY)

C-101	Duramic, 200 mmf.	47CB15F201J5
C-138, 141	Ceramic, 100 mmf.	47X25UK101K/D
C-102, 105	Ceramic disc, .001 mfd 500V 20%	47A503
C-103	Electrolytic, 10 mfd 350V	45B415

CAPACITORS (SIDEBAND GEN. ASSEMBLY)(cont.)

C-104, 106, 107, 110, 122, 124, 127, 131, 134, 135, 136, 140, 142, 143, 145, 147, 148, 150	Ceramic disc, .005 mfd 20%	47A442
C-108	Electrolytic, 10 mfd 150V.	45B307
C-109	Molded paper, .022 mfd 200V 10%	46BR223L2
C-111, 121, 123	Trimmer, 5-25 mmf	44A473
C-112	Duramic, 33 mmf 5%	47CB15F330J5
C-113	Duramic, 120 mmf 5%	47CB15F121J5
C-114	Ceramic tubular, 68 mmf 5% N750	47X25UK680J/D
C-115	Ceramic, 18 mmf ±5% N80 30 PPM	47X20LG180J
C-116, 118	Variable, 2-13 mmf	48B316
C-117	Duramic, 39 mmf 5%	47CB15F390J5
C-119	Duramic, 390 mmf 5%	47CB15F391J3
C-120, 125, 128	Tubular ceramic, 18 mmf 5% NPO	47X20CG180J/D
C-126, 129	Tubular ceramic, 43 mmf 5% NPO.	47X25CG430J/D
C-130	Trimmer, 3-12 NPO	44B483
C-132	Tubular ceramic, 47 mmf 5% NPO.	47X25CG470J/D
C-133	Ceramic disc, .01 mmf. 500V	47-224
C-137, 139	Part of T1	
C-144	Ceramic, 100 mmf 5% NPO.	47X35CG101J
C-146	Trimmer, 8-50 mmf N750	44B484
C-149	Ceramic, 5 mmf N750 10%	47X20UK050K/D

RESISTORS (MAIN CHASSIS)

R-1, 6, 32	47k ohm 10% 1/2w	23X20X473K
R-2, 13, 15	22k ohm 10% 1w, Fixed comp	23X30X223K
R-3, 55, 58, 64	4700 ohm 1w 10%, Comp.	23X30X472K
R-4	1000 ohm 10% 1/2w	23X20X102K
R-5	3900 ohm 10% 1/2w	23X20X392K
R-7, 8	47,000 ohm 1w 10%	23X30X473K
R-9, 19, 31, 38, 39	1000 ohm 1w 10%, Comp.	23X30X102K
R-10, 28	100k ohm 10% 1/2w, Comp.	23X20X104K
R-11	39,000 ohm 2w 10%, Comp.	23X42X393K
R-12	12,000 ohm 2w 10%, Comp.	23X42X123K
R-14, 63	18,000 ohm 1w 10%, Comp.	23X30X183K
R-16	10,000 ohm 1w 5%	23X30X103J
R-17, 18	100 ohm 1w 10%, Comp.	23X30X101K
R-20	6800 ohm 2w 5%	23X42X682J
R-21	1200 ohm 1w 5%	23X30X122J
R-22	5600 ohm 5% 1/2w, Comp.	23X20X562J
R-23	50k - Meter Compression, Variable	25C1413
R-24	22k ohm 10% 1/2w, Comp.	23X20X223K
R-25	220k ohm 5% 1w, Comp.	23X30X224J
R-26	15k ohm 5% 1w, Comp.	23X30X153J
R-27	47 ohm 10% 1/2w, Comp.	23X20X470K
R-29	10k ohm 10% 1/2w, Comp.	23X20X103K
R-30	220 ohm 10% 1w, Comp.	23X30X221K
R-33, 34, 51	470 ohm 10% 1w	23X30X471K
R-35	27k ohm 10% 1w, Comp.	23X30X273K
R-36, 47, 59	100,000 ohm 1w 10%, Comp	23X30X104K
R-40	1500 ohm 10w 5%	24BG152D
R-41	2500 ohm 10w 5%	24BG252D
R-42	1 meg - Vox. Variable	25B1137
R-43, 56	.1 meg 10% 1/2w, Comp	23X20X105K
R-44, 54, 57	330,000 ohm 1w 10%, Comp.	23X30X334K
R-45	1200 ohm 1w 10%, Comp.	23X30X122K
R-46	220k ohm 10% 1/2w, Comp.	23X20X224K
R-48	820,000 ohm 1w 10%, Comp.	23X30X824K
R-49	5 meg - Delay, Variable	25B1141
R-50	82,000 ohm 1w 10%, Comp.	23X30X823K
R-52	1500 ohm 10% 1w, Comp.	23X30X152K
R-53	1 meg - Anti-Trip sens, Variable	25B1137
R-60, 65, 66	1 meg 1w 10%, Comp.	23X30X105K
R-61	10k - Bias Adj. Variable	25B1412

RESISTORS (MAIN CHASSIS) (cont.)

R-62	12,000 ohm 1w 10%, Comp.	23X30X123K
R-67, 68	220,000 ohm 2w 1% carbon	23X42X224K

RESISTORS (SIDEBAND GENERATOR) (cont)

R-101, 130, 144, 147	47,000 ohm 1w 10%	23X30X473K
R-102, 103, 113	470,000 ohm 1w 10%, Comp.	23X30X474K
R-104, 105, 114, 118, 133, 138, 153, 160	100k ohm 10% 1/2w, Comp.	23X20X104K
R-106, 109, 129	4700 ohm 1w 10%, Comp.	23X30X472K
R-107, 108, 146, 152	1 meg 10% 1/2w, Comp.	23X20X105K
R-110	1 meg - Audio Level, Variable	25C1414
R-111, 125, 132, 139, 151	220k ohm 10% 1/2w, Comp.	23X20X224K
R-112, 116, 117, 134, 145, 148	10,000 ohm 1w 10%, Comp.	23X30X103K
R-115	2.7k ohm 10% 1w, Comp.	23X30X272K
R-119, 131, 136, 137	2.2k ohm 10% 1w	23X30X222K
R-120	2700 ohm 5% 1/2w, Comp.	23X20X272J
R-121	12k ohm 5% 1/2w, Comp.	23X20X123J
R-122, 127, 154	1000 ohm 10% 1/2w	23X20X102K
R-123	1.1 meg ±10%, Temp. Comp.	23A127
R-124	220k ohm 5% 1/2w, Comp.	23X20X224J
R-126	470 ohm 10% 1/2w, Comp.	23X20X471K
R-128	180 ohm 10% 1w	23X30X181K
R-135	5000 ohm - Oscillator Level, Variable	25B1392
R-140	2200 ohm 10% 1/2w, Comp.	23X20X222K
R-141, 162	4700 ohm 10% 1/2w. Comp.	23X20X472K
R-142	470 ohms 10% 1W	23X30X471K
R-143	100,000 ohm 1w 10%, Comp.	23X30X104K
R-149	50k - Calibrate Level, Variable	25C1415
R-150	22k ohm 5% 1/2w, Comp.	23X20X223J
R-155	470K ohms 10% 1/2w	23X20X474K
R-156	820k ohm 10% 1/2w, Comp.	23X20X824K
R-157	1.8 meg 10% 1/2w, Comp.	23X20X185K
R-158	120K ohms 10% 1/2w, Comp.	23X20X124K
R-159	1 meg RF level, Variable	25C1416
R-161	300k, Gain Level, Variable	25B1426

TRANSFORMERS AND COILS

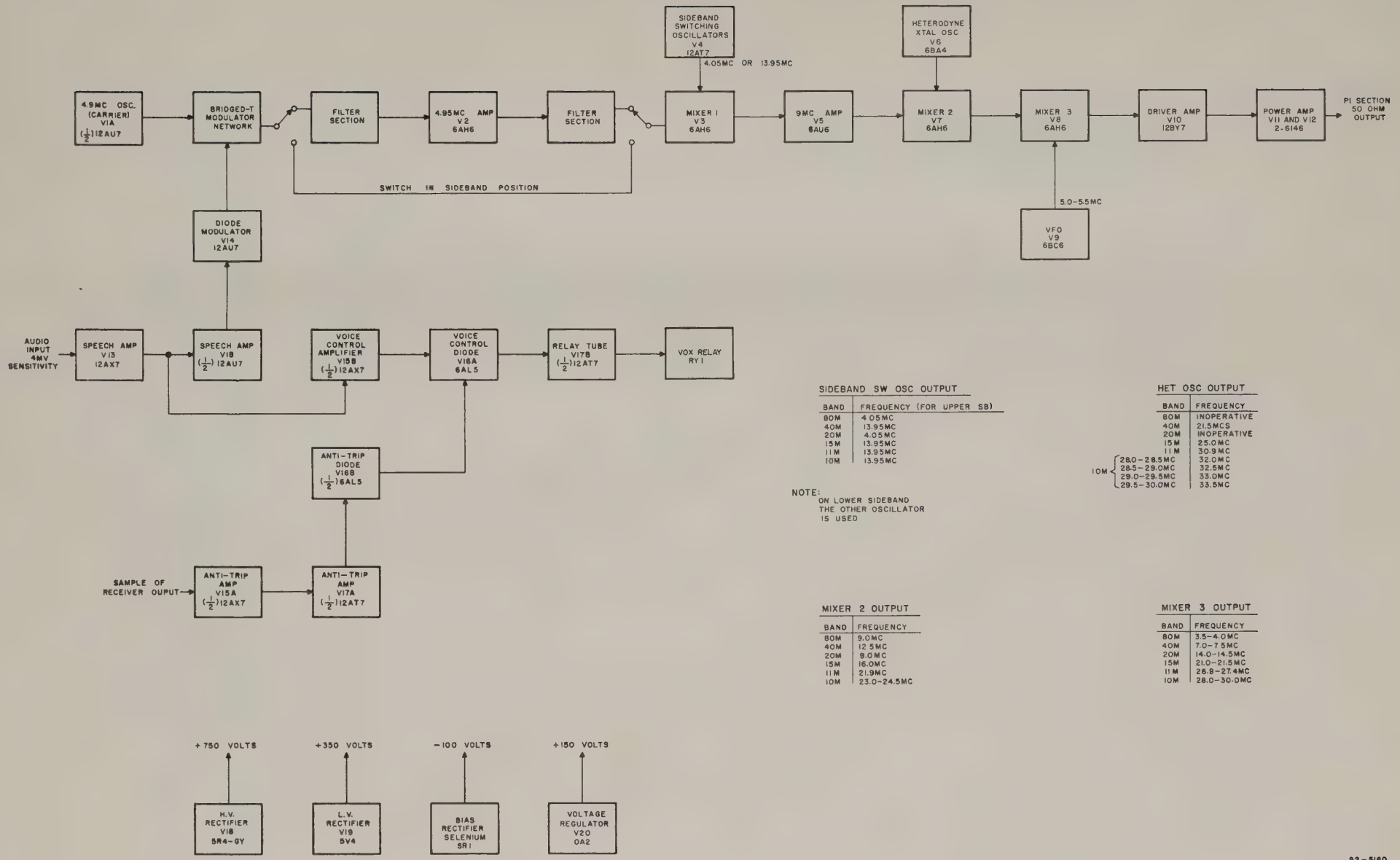
L-1	Coil Assembly, VFO	51B2180
L-2	Choke, VFO Filament	53B359
L-4, 8	Coil, 11-10M	51B2015
L-5, 9	Coil, R.F. 15-20M	51B2181
L-6, 10	Coil, 40M	51B2017
L-7, 11	Coil, 80M	51B2018
L-12, 14	Choke, Parasitic Suppresser	53B417
L-13, 3	Choke, R.F. 2.5 MH	53B335
L-15	Choke, Filament	53B358
L-16	Choke, RF, Final Plate	53B426
L-17	Coil, Final Tank	51C2229
L-18	Choke, RF, Safety	53A160
L-19, 20	Coil, XTAL Osc. Grid, 15 & 40 M	51B2251
L-21	Coil, XTAL Osc. Grid, 10 & 11 M	51B2250
L-22	Coil, R.F. Oscillator	51B2235
L-23	Coil, R.F. 1st Mixer Plate	51B2182
L-24	Coil, 32-33.5 MC Trap	51B2234
L-25	Choke, Filter - 9 HY @ 135 MA	56C259
L-26	Choke, Filter - 8 HY @ 175 MA	56C260
L-101	Coil, Modulator	51B2247
L-102	Coil, Modulator output	51B2248
L-103	Choke, R.F. Coil, Crystal Filter	53A107 51B2230
T-1, 2	Transformer, I.F. 9 MC	50B701
T-3	Transformer, VFO Band Pass Filter	50B679
T-4	Transformer, Power	52D477

SWITCHES AND WAFERS

BS	Switch, Band Selector	60B784
FS	Switch, Function	60-822
OS	Switch, Operation	60-821
	Wafer, Switch, 1st Mixer	62B103

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES AND WAFERS (cont)	
	Wafer, Switch, Mix	62B103
	Switch, Wafer	62B112
	PLUGS AND CONNECTORS	
SO-3	Socket, 10 Pin	6A712
SO-4	Socket, 6 Pin	6A713
P-4	Plug, 6 Pin	6A714
P-3	Plug, 10 Pin	6A715
SO-10	Socket, AC (Fan)	10B015
P-10	Plug, AC (Part of Fan Motor Assembly	
SO-9	Connector, Coax	10A056
P-2, 5	Plug, Phono	10A231
P-11	Plug, AC Power Plug	
SO-1	Connector, Mike	29A043
SO-7	Jack, Shorting	36A002
SO-6	Jack, Non Shorting	36A064
SO-2, 5	Jack, Phono	36A041
	TUBES AND RECTIFIERS	
V-1, 14	Tube, Electron Type 12AU7	90X12AU7
V-2, 3, 7, 8	Tube, Electron Type 6AH6	90X6AH6
V-4, 17	Tube, Electron Type 12AT7	90X12AT7
V-5	Tube, Electron Type 6AU6	90X6AU6
V-6	Tube, Electron Type 6AB4	90X6AB4
V-9	Tube, Electron Type 6CB6	90X6CB6
V-10	Tube, Electron Type 12BY7	90X12BY7
V-11, 12	Tube, Electron Type 6146	90X6146
V-13, 15	Tube, Electron Type 12AX7	90X12AX7
V-16	Tube, Electron Type 6AL5	90X6AL5
V-18	Tube, Electron Type 5R4GY	90X5R4GY
V-19	Tube, Electron Type 5V4G	90X5V4G
V-20	Tube, Electron Type OA2	90XOA2
SR-1	Rectifier, Selenium	27B224
	LAMPS AND FUSES	
LM-1	Lamp, Pilot Type #47 Meter	39A004
LM-2 3	Lamp, Pilot Type #44, Dial	39A003
F-1	Fuse, 4 amp, Slo-Blo, 3AG	39A448
	KNOBS	
	Knob, Final Tuning	15B1049
	Knob, Operation	15B1050
	Knob, Function	15B807
	Knob, Meter Compression	15C812
	Knob, R.F. Level	15B812
	Knob, Audio Level	15B812
	Knob, Calibrate Level	15B812
	Knob, Friction Brake	15A899
	Knob, Main Tuning VFO	15B1046
	Knob, Bandswitch	15B1047
	Knob, Driving Tuning	15A811
	CRYSTALS AND DIODES	
CR-1	Crystal, Carrier Osc. (4950.000 KC)	19-1956
CR-2	Crystal, (Shunt) (4949.000)	19-1959
CR-3	Crystal, Sideband Rev. (4050.000 KC)	19-1957
CR-4	Crystal, Sideband Rev. (13950.000 KC)	19-1958
CR-5	Crystal, 21.5 MC	19-1960
CR-6	Crystal, 25 MC	19-1961
CR-7	Crystal, 32.5 MC	19B1964
	Crystal, 30.9 MC	19B1962
	Crystal, 32.0 MC	19B1963
	Crystal, 33.0 MC	19B1965
	Crystal, 33.5 MC	19B1966
CR-8	Rectifier Diode	19A1916
FL-1, 2	Crystal Filter (4949.650)	19C1954
	MISCELLANEOUS	
	Ball Bearing (Gear Drive)	77A505
	Ball Bearing (Gear Drive)	77A1099
	Ball Race (Gear Drive)	77B1020
	Box, Tank Coil	66C1458
	Bracket, Mtg. relay	67B4642
	Bracket, Mtg. Crystal filter	67B4347
	Bracket, Control mtg. Int.	67A4355
	Bracket, Motor Mtg.	67B4182
	Bracket, Control Mtg. Ext.	67A4204
	Bracket, Meter mtg. R.H.	67B4340
	Bracket, Meter mtg. L.H.	67B4341
	Bracket, Motor support	67C4345
	Bracket, Mtg. Trimmer & Coil	67B3456
	Bracket, Mtg. Coil Assembly	67A3458
	Bracket, Gear Drive & Shield Mtg.	67A3459
	Bracket, Trimmer mtg.	67A3922
	Bracket, Gear drive mtg.	67A3011
	Bracket, Gear adj.	67A3042
	Bracket & Shaft Assembly (Idler Gear)	67B3113
	Bracket, Mtg. (Stop Arm)	67B3162
	Bracket, PA Tuning mtg.	67B4342
	Bracket (Unit Mounting) (Driver Assembly)	67B4343
	Bushing & Cam Assembly (Gear Drive)	77B951
	Bushing, Dial (Gear Drive)	77B1038
	Bushing, Friction Brake (Gear Drive)	77A1037
	Cabinet, Foot	16A029
	Cabinet Bottom	66D1494
	Channel, Rubber (Front Panel)	16-118
	Connector	10A961
	Coupler, Solid	29A264
	Cover, Sideband Gen	66D1408
	Cover, Cabinet Top	66A1451
	Cover, Final Amp.	66D1456
	Cover, Box	66B1457
	Cover, Transformer	66C1459
	Cover, Relay	66B1460
	Crescent Ring (Gear Drive)	76A725
	Dial, Scale, Main Tuning (Gear Drive)	83E568
	Escutcheon, Front Panel	7E659
	Fan Blade	80C305
	Flywheel	71A205
	Gear, Pinion Assembly	41B50012
	Gear, Idler Assembly	26B283
	Glass, Dial (MT)	22B540
	Grommet (Motor Mounting)	16A034
	Holder, Fuse	6A451
	Insulator, Feed-Thru	8A1015
	Insulator (Insert)	8A3697
	Insulator (Insert)	8A3722
	Insulator, Feed-Thru	8A1014
	Instruction Book	94X1652
	Lever, Brake (Friction Brake)	74B999
	Line Cord & Plug	87B4833
	Line Cord Lock	76B756-1
	Line Cord Lock	76B756-2
	Line Cord & Plug	87A481
M-1	Meter, Output Level	82D386
	Motor, Fan	20A088
	Pad (Clutch) (Gear Drive)	8A2866
	Panel, Front	68D515
	Plate, Condenser Mounting	63A027
	Plate, Foot Reinforcing	63A334
	Pointer, Dial Scale	82B320
	Post, Latch	11A226
RY-1	Relay (Voice Control)	21-197
	Ring, Grip (Gear Drive)	76-1135
	Ring, Retaining (Gear Drive)	76-775
	Ring, Retaining (Gear Drive)	76A1612
	Shaft, Friction brake	74B1282
	Shaft, PA tuning	74B1283
	Shaft, Driver tuning	74B1284
	Shaft, Band Selector	74B1285
	Shield, Tube	69A716
	Shield, Center (Coil Assembly)	69B822
	Shield, Can	69A833
	Shield, Oscillator socket	69A834
	Shield, "J" Lock	69-863
	Shield, VFO	69C1032
	Shield, Can	69B931
	Shield, Can	69B966
	Shield, Tube	69A097
	Shield	69A306
	Socket, Tube (Octal) Mica	6A359
	Socket, Tube (Octal) Mica	6A317
	Socket Assembly Pilot Light	86B297
	Socket, Tube 7 Pin Min. Cer.	6A354
	Socket, Xtal.	6A320
	Socket, Tube, 9 Pin Min. Mica	6B500
	Socket, Tube, 7 Pin Min. Mica	6B505
	Socket, Tube, 7 Pin Min.	6A645
	Socket, Tube, 9 Pin w/Base	6B672
SO-8	Socket, Power, 11 Pin	6A707
	Spacer (Driver Unit Mounting)	73-724
	Spacer, Stop Arm (Gear Drive)	73A1208
	Spring, Compression Idler Gear)	75A376
	Spring, Final Amp. Cover	75B417
	Spring (Gear Drive)	75A345
	Spring, Torsion, (Stop Arm)	75A381
	Stop Arm & Pin (Gear Drive)	76B1418
	Stud, Gear Bracket (Gear Drive)	3-3500
	Stud, Shoulder (Gear Drive)	73B1127
	Stud, Shoulder (Stop Arm) (Gear Drive)	73B1123



SIDEBAND SW OSC OUTPUT

BAND	FREQUENCY (FOR UPPER SB)
80M	4.05MC
40M	13.95MC
20M	4.05MC
15M	13.95MC
11M	13.95MC
10M	13.95MC

NOTE:
ON LOWER SIDEBAND THE OTHER OSCILLATOR IS USED

HET OSC OUTPUT

BAND	FREQUENCY
80M	INOPERATIVE
40M	21.5MCS
20M	INOPERATIVE
15M	25.0MC
11M	30.9MC
10M 28.0-28.5MC	32.0MC
10M 28.5-29.0MC	32.5MC
10M 29.0-29.5MC	33.0MC
10M 29.5-30.0MC	33.5MC

MIXER 2 OUTPUT

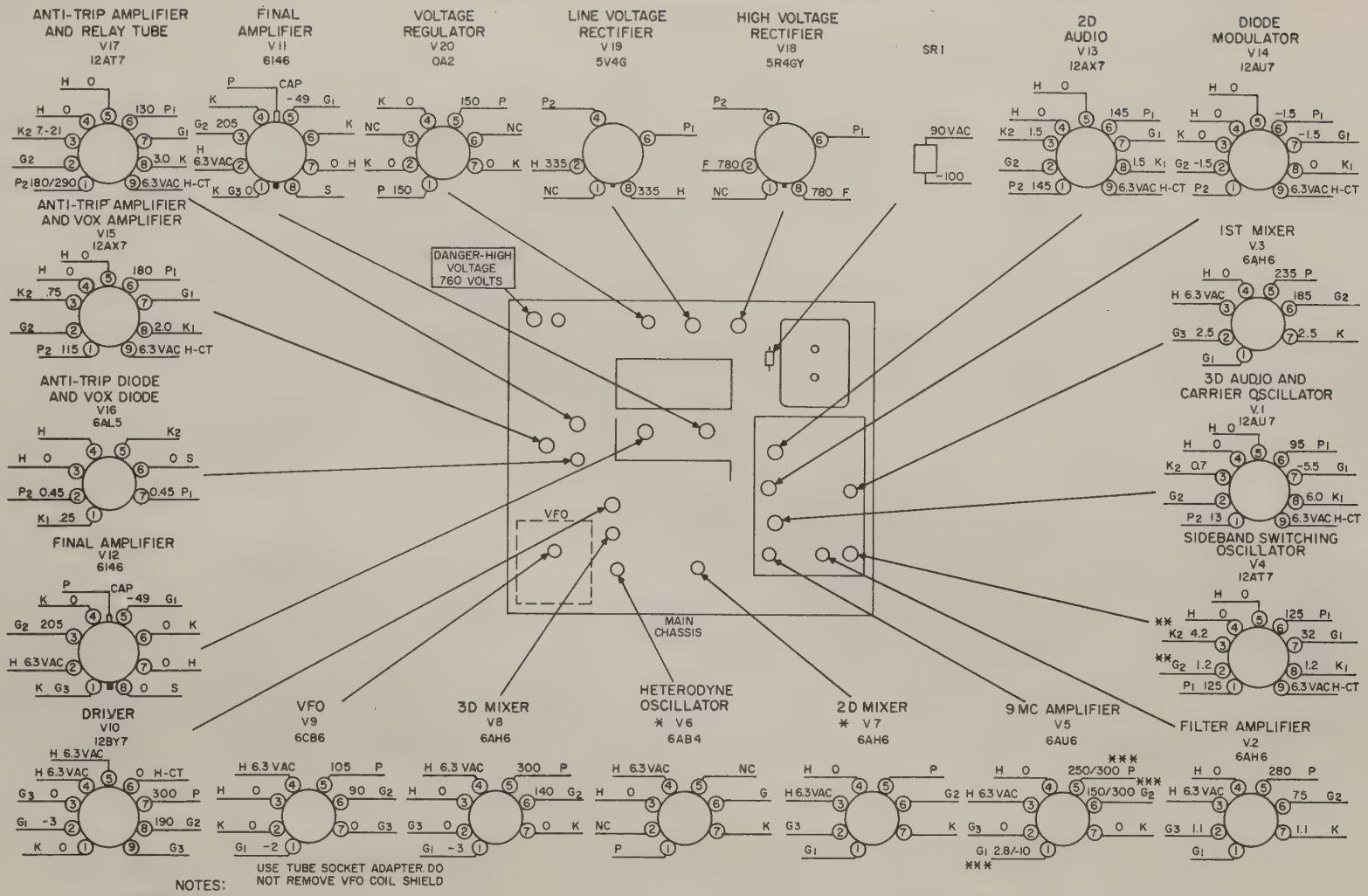
BAND	FREQUENCY
80M	9.0MC
40M	12.5MC
20M	9.0MC
15M	16.0MC
11M	21.9MC
10M	23.0-24.5MC

MIXER 3 OUTPUT

BAND	FREQUENCY
80M	3.5-4.0MC
40M	7.0-7.5MC
20M	14.0-14.5MC
15M	21.0-21.5MC
11M	26.9-27.4MC
10M	28.0-30.0MC

92-5160

Figure 10. Block Diagram



NOTES:

1. BASING DESIGNATION; BOTTOM VIEW OF TUBE SOCKETS.
2. * SOCKET VOLTAGES VS, BAND SWITCH SETTING. (SEE CHART)
3. ** CHART VOLTAGES SHOWN ARE FOR UPPER SIDEBAND POSITION ON 80 METERS-NO MODULATION.
4. *** VOLTAGE CHANGE ACCORDING TO WHERE FACTORY GAIN IS SET.
5. FOR CONVENIENCE ON SIDEBAND GENERATOR UNIT USE TUBE SOCKET ADAPTER FOR VOLTAGE CHECKS.

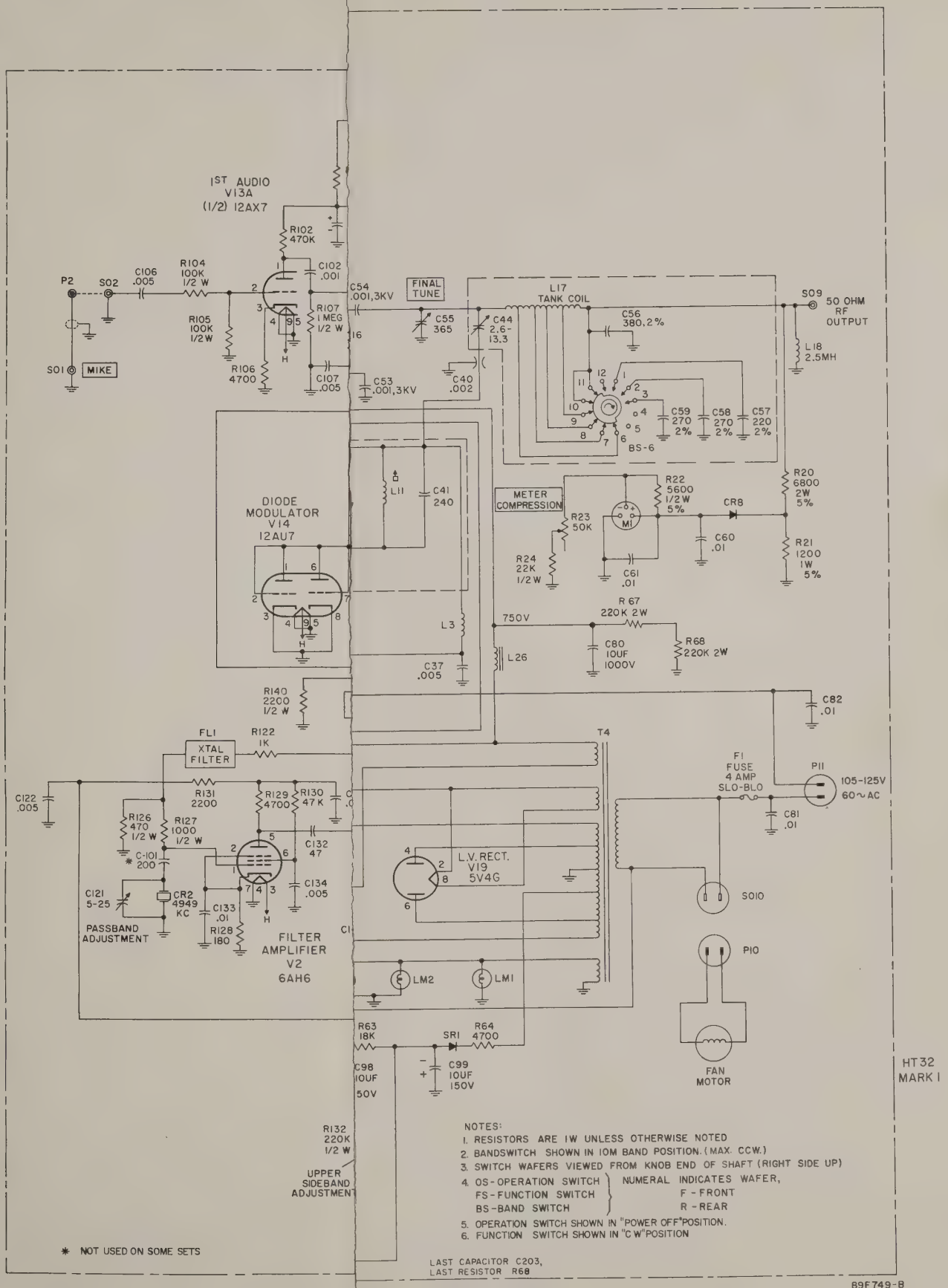
TUBE	PIN	80M	40M	20M	15M	10M
6AB4 HETERODYNE OSCILLATOR	PLATE	145V	145V	145V	145V	145V
	CATHODE	1.2V	1.35V	1.2V	1.2V	1.2V
	GRID	0V	-2.7V	0V	-1.5V	-1.5V
6AH6 HETERODYNE MIXER (NO SIGNAL FROM SIDEBAND GENERATOR)	PLATE	310V	310V	280V	310V	310V
	SCREEN	115V	30V	100V	115V	110V
	CATHODE	2.1V	.7V	1.5V	2.2V	2.3V

92-5161

Figure 11. Voltage Chart

NOTES

NOTES


1ST AUDIO V13A (1/2) 12AX7
R102 470K
C102 .001
R104 100K 1/2 W
C106 .005
P2
SO2
SO1
MIKE
R105 100K 1/2W
R106 4700
R107 1 MEG 1/2 W
C107 .005
C54 .001,3KV
FINAL TUNE
C55 365
C44 2.6-13.3
C53 .001,3KV
C40 .002
L17 TANK COIL
C56 380,2%
SO9 50 OHM RF OUTPUT
L18 2.5MH
C59 270 2%
C58 270 2%
C57 220 2%
BS-6
DIODE MODULATOR V14 12AU7
L11
C41 240
METER COMPRESSION
R23 50K
R22 5600 1/2W 5%
CR8
R20 6800 2W 5%
R21 1200 1W 5%
C60 .01
C61 .01
R24 22K 1/2W
R67 220K 2W
750V
C80 10UF 1000V
R68 220K 2W
L3
L26
C37 .005
R140 2200 1/2 W
C82 .01
FL1 XTAL FILTER
R122 1K
T4
F1 FUSE 4 AMP SLO-BLO
P11 105-125V 60~AC
C81 .01
C122 .005
R131 2200
R129 4700
R130 47K
R126 470 1/2 W
R127 1000 1/2 W
C-101 * 200
C132 47
C134 .005
C121 5-25
CR2 4949 KC
C133 .01
R128 180
PASSBAND ADJUSTMENT
FILTER AMPLIFIER V2 6AH6
L.V. RECT. V19 5V4G
SO10
P10
LM2
LM1
R63 18K
SR1
R64 4700
C98 10UF 50V
C99 10UF 150V
FAN MOTOR
R132 220K 1/2 W
UPPER SIDEBAND ADJUSTMENT
* NOT USED ON SOME SETS
NOTES:
1. RESISTORS ARE 1W UNLESS OTHERWISE NOTED
2. BANDSWITCH SHOWN IN 10M BAND POSITION. (MAX. CCW.)
3. SWITCH WAFERS VIEWED FROM KNOB END OF SHAFT (RIGHT SIDE UP)
4. OS - OPERATION SWITCH
FS - FUNCTION SWITCH
BS - BAND SWITCH
NUMERAL INDICATES WAFER,
F - FRONT
R - REAR
5. OPERATION SWITCH SHOWN IN "POWER OFF" POSITION.
6. FUNCTION SWITCH SHOWN IN "C W" POSITION
LAST CAPACITOR C203,
LAST RESISTOR R68
89F749-B
HT32 MARK I

NOTES

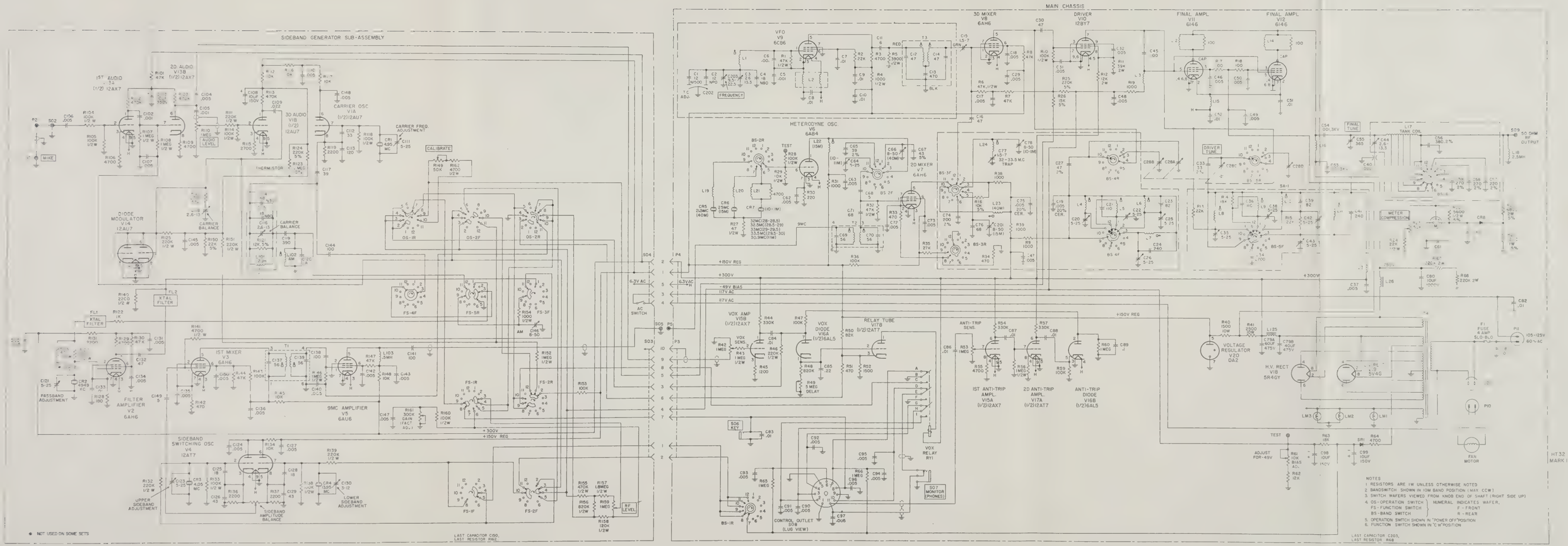

SIDEBAND GENERATOR SUB-ASSEMBLY
MAIN CHASSIS
1ST AUDIO V1A (1/2) 12AX7
2D AUDIO V1B (1/2)12AX7
30 AUDIO V1B (1/2) 12AU7
CARRIER OSC V1A (1/2)12AU7
CARRIER FREQ. ADJUSTMENT
CALIBRATE
MIKE
AUDIO LEVEL
THERMISTOR
DIODE MODULATOR V1A 12AU7
CARRIER BALANCE
XTAL FILTER
FILTER AMPLIFIER V2 6AH6
PASSBAND ADJUSTMENT
IST MIXER V3 6AH6
9MC AMPLIFIER V5 6AU6
SIDEBAND SWITCHING OSC V4 12AT7
UPPER SIDEBAND ADJUSTMENT
LOWER SIDEBAND ADJUSTMENT
SIDEBAND AMPLITUDE BALANCE
OS-1R
OS-2F
OS-2R
FS-4F
FS-5R
FS-3F
FS-1R
FS-2R
FS-1F
FS-2F
AM
6.3V AC
AC SWITCH
+150V REG
+300V
-49V BIAS
117V AC
117V AC
VFO V9 6CD6
FREQUENCY
30 MIXER V8 6AH6
DRIVER V10 12BY7
FINAL AMPL. V11 6146
FINAL AMPL. V12 6146
HETERODYNE OSC. V6 6AB4
20 MIXER V7 6AH6
TANK COIL
DRIVER TUNE
METER COMPRESSION
50 OHM RF OUTPUT
VOX AMP V15B (1/2)12AX7
VOX DIODE V16A (1/2)6AL5
RELAY TUBE V17B (1/2)12AT7
VOX RELAY RY1
MONITOR (PHONES)
CONTROL OUTLET (LUG VIEW)
IST ANTI-TRIP AMPL. V15A (1/2)12AX7
2D ANTI-TRIP AMPL. V17A (1/2)12AT7
ANTI-TRIP DIODE V16B (1/2)6AL5
VOLTAGE REGULATOR V20 0A2
H.V. RECT V18 5R4GY
TEST
ADJUST FOR -49V
FAN MOTOR
105-125V 60~AC
HT32 MARK I
* NOT USED ON SOME SETS
LAST CAPACITOR C150, LAST RESISTOR R162
LAST CAPACITOR C203, LAST RESISTOR R68
NOTES
1. RESISTORS ARE 1W UNLESS OTHERWISE NOTED
2. BAND SWITCH SHOWN IN 10M BAND POSITION (MAX. CCW)
3. SWITCH WAFERS VIEWED FROM KNOB END OF SHAFT (RIGHT SIDE UP)
4. OS-OPERATION SWITCH } NUMERAL INDICATES WAFER.
FS-FUNCTION SWITCH } F-FRONT
BS-BAND SWITCH } R-REAR
5. OPERATION SWITCH SHOWN IN "POWER OFF" POSITION
6. FUNCTION SWITCH SHOWN IN "CW" POSITION
89F749-B

Figure 12.

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

communications

OPERATING and SERVICE INSTRUCTIONS

HT-33
MARK I

the hallicrafters co.
MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.



Figure 1. Photograph HT-33 Linear Power Amplifier

SECTION I
GENERAL DESCRIPTION

1-1. The Hallicrafters Model HT-33 is a precision built, ultra compact one thousand watt linear amplifier, employing two 4CX300A long life, extra rugged, ceramic tetrodes operating Class AB1. This mode of operation gives the maximum in efficiency along with a minimum of distortion and extremely modest drive requirements. This unit has been engineered to provide highly efficient operation when used in conjunction with Hallicrafter's Model HT-30 or HT-32 (with suitable pad) SSB exciters. Other exciter units may be employed if they are capable of delivering sufficient output power to utilize the full capabilities of the HT-33. The exciter should also be capable of approaching the high performance standards of the Hallicrafters HT-30 or HT-32 as applied to signal quality and stability. The nominal power output will be 625 watts P.E.P. with 8 watts P.E.P. drive on all bands with all distortion products down better than 30 D.B.

The circuit employs two 4CX300A ceramic tetrodes in parallel. The completely self contained power supply uses two 866A's connected in a full wave rectifier circuit with excellent regulation. Screen voltage is controlled by VR tubes. A variable bias supply is also included to maintain proper idling plate current. Provision has been made to apply full cut-off bias to the amplifier tubes by de-energizing the 6.3V AC bias relay which is terminated at terminal strip TS-1 on the rear of the chassis. Connection should be made through a set of contacts on an external antenna change-over relay and connected between pin 1 and 4 of TS-1.

Overload protection is provided by separate fuses, a 5 amp. fuse for all filaments, bias supply, blower and base fan, and a 15 amp. fuse in the primary of the plate supply transformer. The 15 amp. fuse is in an indicator type fuseholder located on the front panel. Should this fuse blow, the fuse holder cap will glow a bright orange color. An interlock safety switch removes the primary voltage from the plate supply transformer when the cabinet cover is open. (Do not attempt to defeat its purpose as lethal voltages will be present). A fixed Pi network is incorporated, giving 50 ohm output on all bands. Under no circumstance should this unit be fed into an unmatched reactive load. All amateur bands 80 through 10 meters are easily tuned without the use of plug in coils.

1-2. TVI SUPPRESSION.

Every consideration has been given to possible local TVI problems in the design of the HT-33. Circuitry has been used that discourages harmonic generation. A low pass filter has been included in series with the AC power leads. The enclosed metal cabinet greatly aids in shielding. A screen has been provided over the meter opening.

1-3. ADDITIONAL FEATURES.

Many additional features have been included for reliability and ease of operation. Bridge neutralization is used to insure stable operation on all bands. Screen and cathode current are easily read on a large dual scale illuminated meter. Meter switching is accomplished by a two position selector switch on the front panel. The entire unit is power ventilated by means of a built in blower and base fan to insure adequate cooling under all operating conditions. A red jewel indicator is used to indicate that primary voltage is applied to the plate supply transformer. All bandswitching is accomplished by a single selector knob.

SECTION II
INSTALLATION

2-1. Unpacking. Check all shipping tags and labels for further instructions before removing or destroying. Check to see that base fan blades turn freely.

Location. The HT-33 should be located reasonably close to the exciter unit.

It is very important that the HT-33 be placed in such a manner that complete air circulation will be had on all sides as well as top and bottom. Under no circumstance should any object be placed on top of this unit.

2-2. Power Source Requirements. The HT-33 is designed for 117 volt 60 cycle AC operation. The source should be capable of supplying 1450 watts with good regulation at the specified operating voltage.

2-3. Rack Mounting. Removal from Cabinet.

If rack mounting is desired, the unit must be removed from the cabinet.

Step #1. Remove one screw from interlock switch bracket and swing switch and bracket into horizontal position.

Step #2. Remove air scoop from blower. This is held in place by three sheet metal screws around blower intake opening.

Step #3. Remove upper and lower panel screws on each side of front panel.

Step #4. Remove five chassis mounting bolts at bottom rear of cabinet.

Step #5. Remove base fan plug.

Step #6. Slide chassis forward from cabinet.

The slots at the edges of the front panel are properly spaced to accommodate mounting screws in a standard 19 inch rack.

The blower air scoop should be replaced if rack mounting is used to prevent recirculation of warm air from the amplifier tubes.

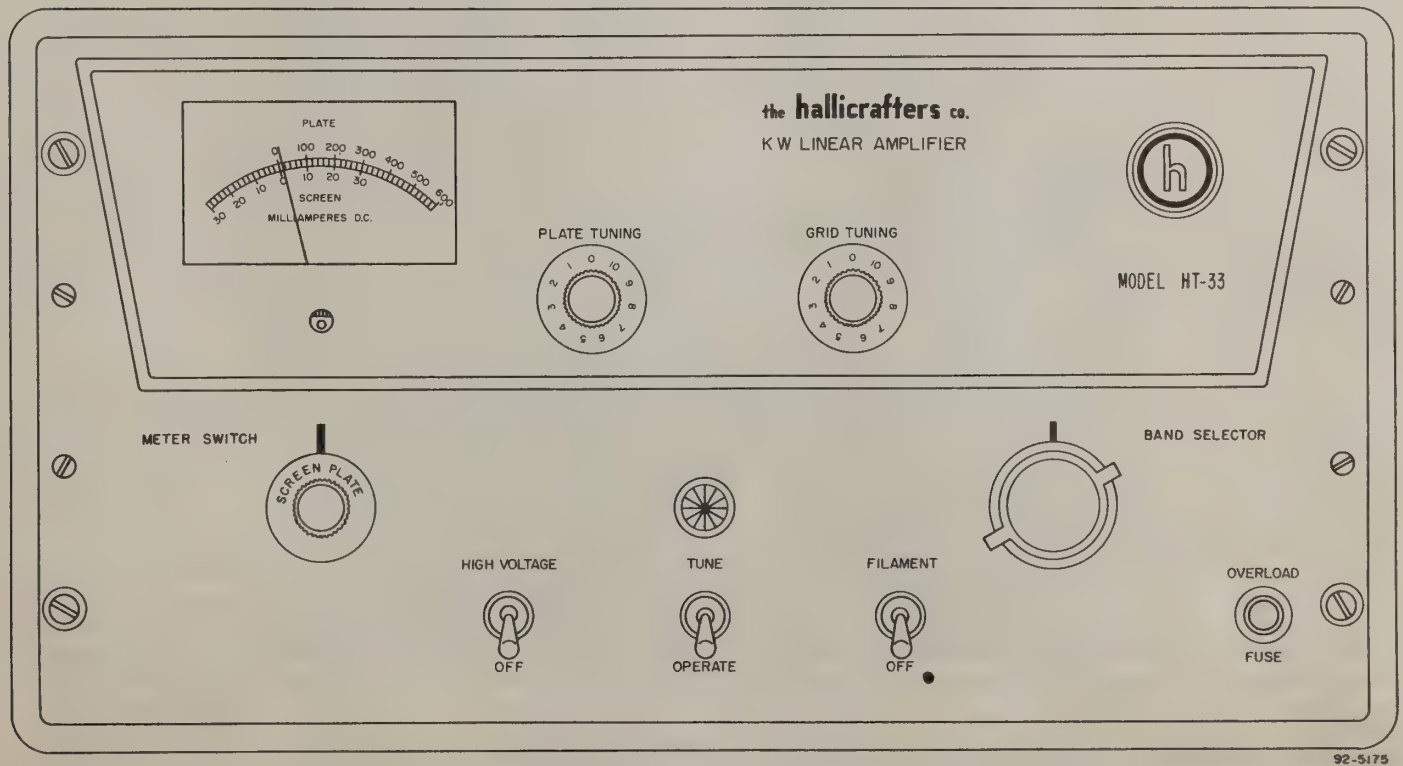


Figure 2. Front Panel View

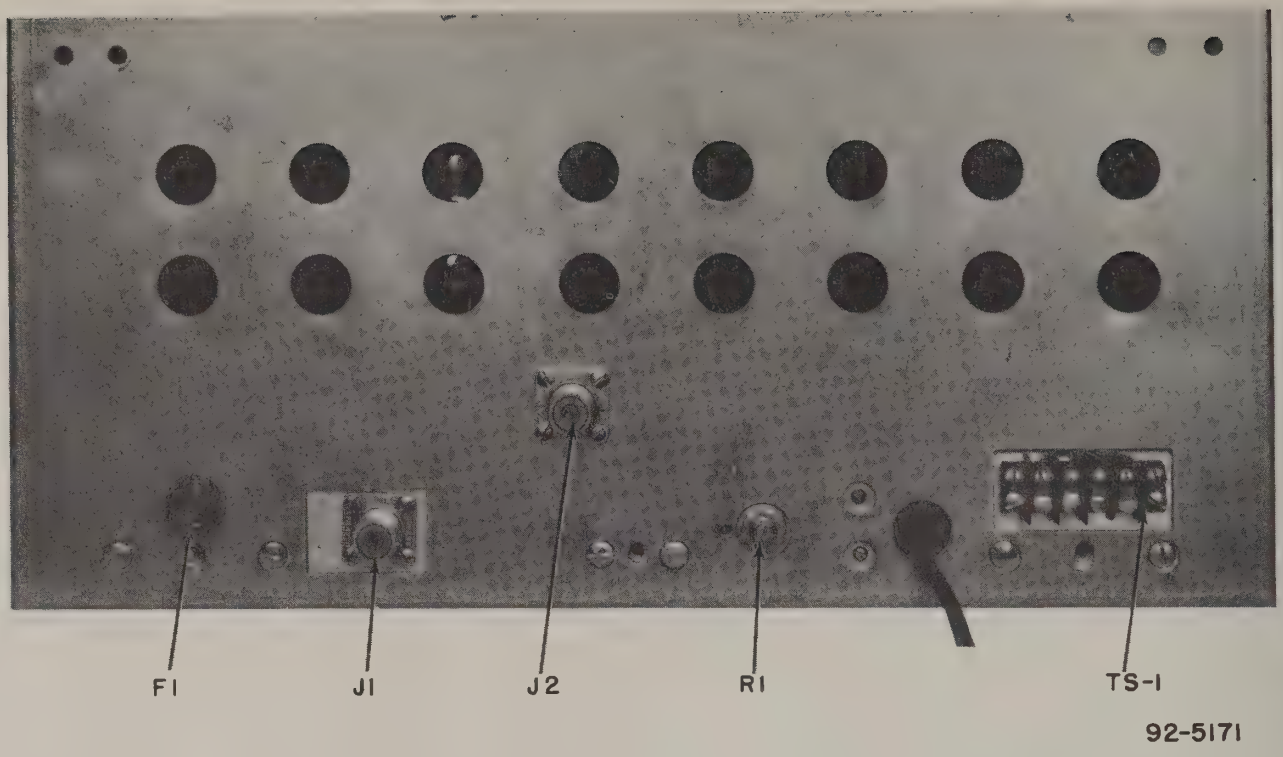


Figure 3. Chassis-Rear View

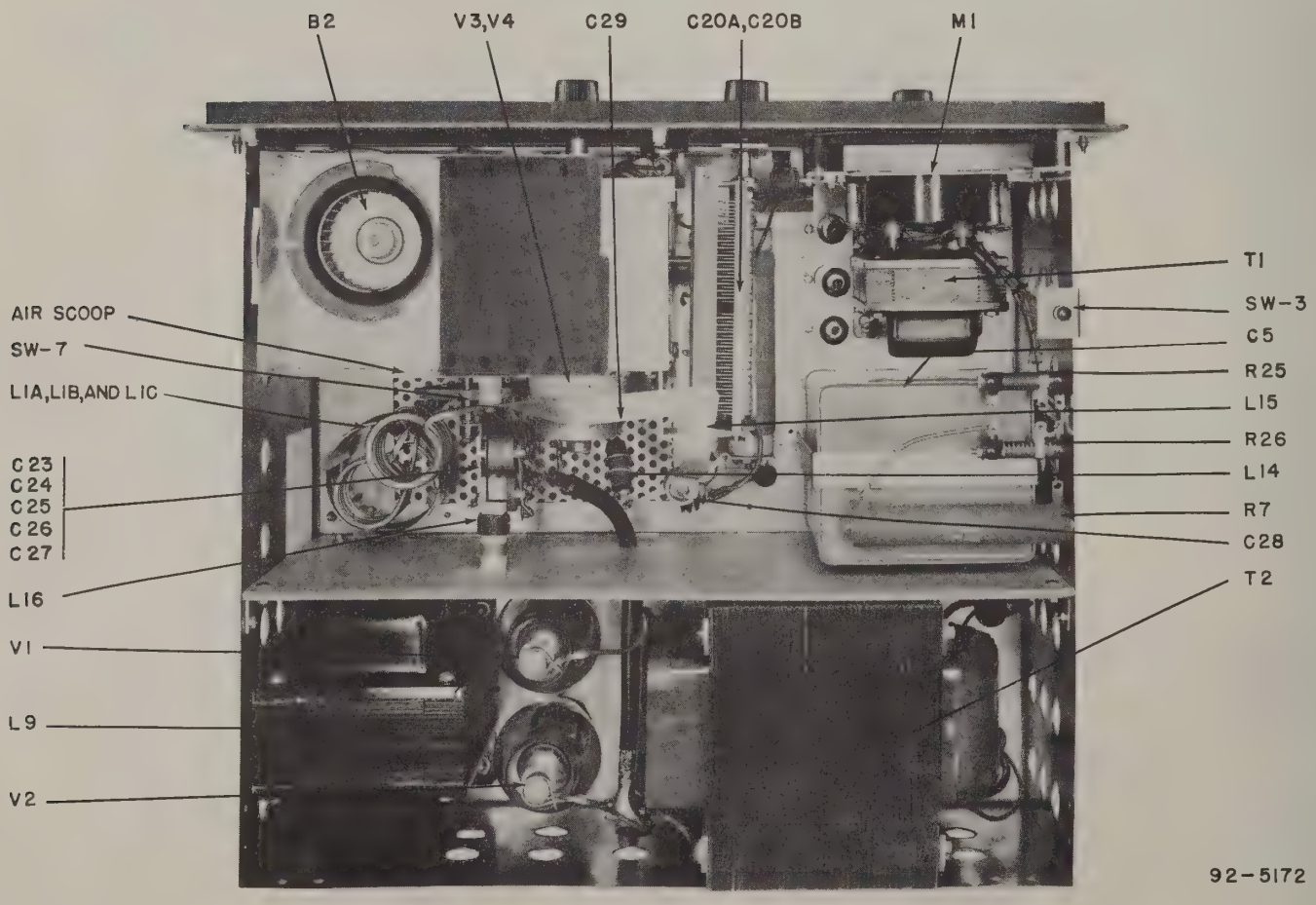


Figure 4. Chassis-Top View

SECTION III
CONTROLS

3-1. Function and use of operating controls. See Figure 2.

Name of Control	Type	Function and Use
Filament Sw.	Toggle (S.P.S.T.)	Connected in series with power line. Used to energize filament, bias, fan, and blower circuits or to disable entire unit.
High Voltage Sw.	Toggle (S.P.S.T.)	Used to energize relay in primary of plate supply transformer.
Meter Sw.	Rotary (2 position)	Connects the meter to read screen current or cathode current. Separate meter scales are provided for screen and cathode readings. The setting of the switch automatically switches in the shunt for reading Cathode current.
Band Selector	Ganged Rotary (5 position)	Selects correct grid and plate coils for each band and switches in correct capacity in Pi network. Also switches in additional stator section of plate tank condenser on 80 meters.
Tune Sw.	Toggle (S.P.S.T.)	Reduces power output during tune up by switching in 100 ohm resistor in cathode circuit thus increasing bias on the tubes.
Grid Tuning	Variable Capacitor	Resonates the grid circuit. Used in conjunction with the exciter output adjustments to load the grid circuit.
Plate Tuning	Variable Capacitor (Split Stator)	Resonates the plate circuit. One section used for 40-20-15-11-10 meters, both sections are used in parallel for 80 meter operation.

3-2. Input Connector. The input connector, located on the rear of the chassis, will mate with an Amphenol type 83-1SP coax connector (not supplied with amplifier). Excitation from the exciter unit should be applied through this connector. The input is designed to be fed from a 50 ohm unbalanced line with very low V.S.W.R.

Caution. Input drive should never be allowed to exceed 20 watts P.E.P. or serious damage will result to the input circuit. It should be remembered that 8 watts P.E.P. will drive this unit to the legal limit. Even less excitation is required for A.M. and C.W.

Do not operate as linear amplifier with switch in "Tune" position as the linearity will be affected.

3-3. Output Connector. The output connector, located on the rear of the chassis will mate with an Amphenol type 83-ISP coax connector (not supplied). The amplifier is designed to work into a 50 ohm Non-reactive load.

SECTION IV
TUNING

4-1. General. The general tuning procedure's are similar to those for any power amplifier. Additional considerations are necessary, however, to insure linear operation and to prevent overloading during tune up procedure. A mismatched load or excessive excitation may result in non-linearity and consequently a high distortion product level being radiated. Initial tuning should be made at the desired frequency using C.W. excitation. Final adjustments for other types of operation will then be simplified. A description of the function of the operating controls is given in Section III. Also refer to Figure 2. Tuning procedures for C.W., S.S.B. and A.M. operation are as follows:

4-2. TUNING PROCEDURE - GENERAL.

The following steps apply to all types of operation.

1. Set "Filament" switch in "OFF" position.
2. Set "High Voltage" switch in "OFF" position.
3. Set "Tune" switch in "Tune" position.
4. Set "Meter" switch in "Plate" position.
5. Set "Band Selector" switch to desired band.
6. Connect 50 ohm load to "Output" coax receptacle.
7. Connect exciter output coax to "Input" coax receptacle.
8. Plug HT-33 A.C. line cord into receptacle capable of delivering a minimum of 1450 watts at 117 volts, 60 cycles.
9. Place "Filament" switch in "ON" position and allow a 10 minute warm up period.

(Note. Blower and base fan should always be in operation when "Filament" switch is on. High voltage should never be applied if either is inoperative.)

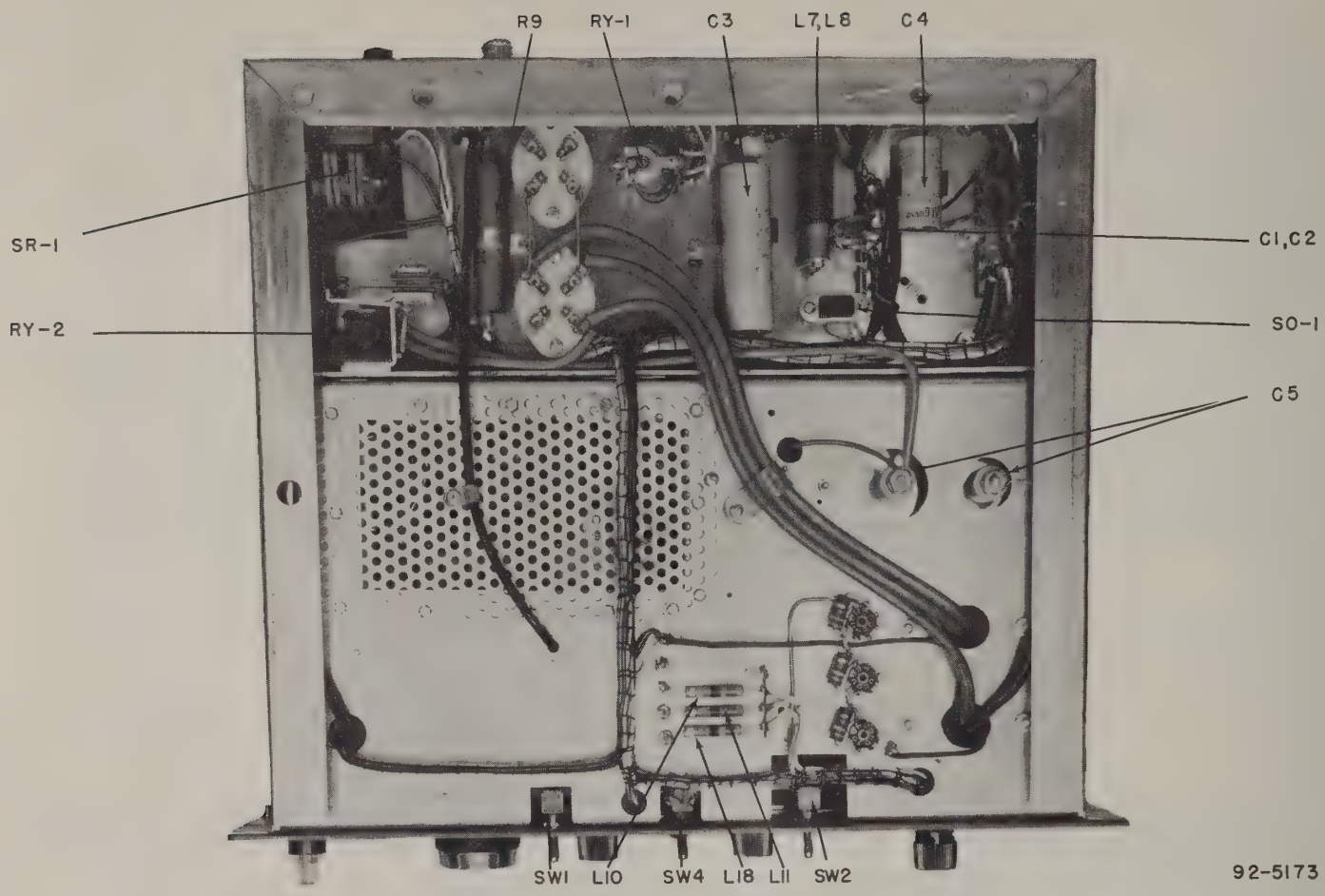


Figure 5. Chassis-Bottom View

4-3. TUNE UP FOR C.W. OPERATION.

1. Place "High Voltage" switch in "ON" position.
2. Carefully apply a small amount of C.W. excitation (approx. 2 watts P.E.P.) and resonate grid circuit of HT-33 by observing increase in meter current.
3. Resonate plate circuit by tuning "Plate Tuning" condenser for minimum plate current.
4. Place "Tune" switch in "Operate" position.
5. Carefully increase excitation to desired input.

Note. 500 ma. will give one Kilowatt input and is the absolute maximum (2000 Volts X 500 Ma.).

4-4. TUNE UP FOR SSB OPERATION.

1. Proceed as described for C.W. operation.
2. Remove C.W. excitation.
3. Place exciter in S.S.B. position, and gradually increase gain control while speaking into microphone until voice peaks show tendency to flatten, as viewed on oscilloscope connected across 50 ohm output. Decrease exciter gain control slightly until voice peaks no longer show any tendency to flatten.

Caution. Do not use meter as voice peak indicator as the meter does not follow the speech plate current swing and therefore in no way indicates true peak power on S.S.B.

Without excitation, idling plate current will normally run between 200-300 ma. for S.S.B. and D.S.B. (See specifications for C.W. operation.)

4-5. TUNE UP FOR DOUBLE SIDE BAND WITH CARRIER. (A.M.)

1. Proceed as described for C.W. operation.
2. Remove C.W. excitation.
3. Place exciter in D.S.B. position and gradually increase excitation until voice peaks show tendency to flatten as viewed on an oscilloscope connected across 50 ohm output. Back off excitation slightly

until voice peaks no longer show any tendency to flatten.

Caution. Any transmitter is subject to spurious radiation if improperly tuned or if the modulation limits are exceeded. Continuous monitoring of the output by means of an oscilloscope is an excellent method of insuring compliance with FCC regulations. This is true both for S.S.B. and D.S.B. operation. For test checks, the "Two-Tone Test" method is highly recommended. Consult "Single Side Band For The Radio Amateur", an A.R.R.L. publication for complete information. (Single tone for D.S.B. with carrier.)

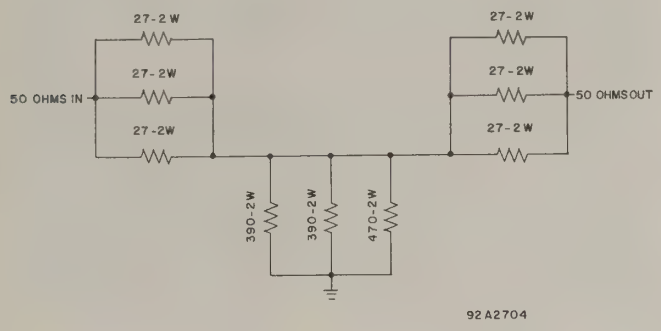


Figure 6. HT-30 50 ohm Pad

* A 3DB pad is recommended for use between a HT-30 SSB exciter and the HT-33. The pad may be conveniently wired in a metal box (6" x 2" x 2") with a removable cover. Amphenol SO-239 receptacles should be installed at each end.

4-6. Note. Some types of SSB exciter units may be optimistically or incompletely rated with respect to their output capabilities. In order to obtain the stability necessary to properly drive a high power linear amplifier, it may be necessary to provide swamping of a portion of the exciter output signal in the coupling between the exciter output and the HT-33 input. As much swamping should be used as possible as this will improve the dynamic stability of the exciter. Also, swamping will improve carrier suppression and unwanted side band figures as these are rated at full exciter output. Be sure that the exciter is linear at the chosen operating level.

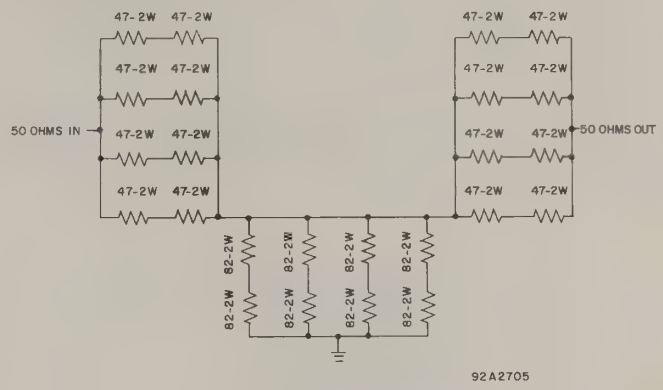
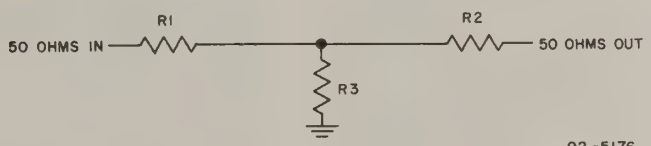


Figure 7. HT-32 50 ohm Pad

** A 9 DB pad is recommended for use between a HT-32 SSB exciter and the HT-33. The pad may be conveniently wired in a metal box (8" x 3" x 3") with a removable cover. Amphenol SO-239 receptacles should be installed at each end.

Typical values for a 50 ohm pad are as follows;



Attenuation	R1-Ohms	R2-Ohms	R3-Ohms	Power Loss
2 DB	6	6	215	36%
*3 DB	9	9	142	50%
5 DB	14	14	82	66%
7 DB	19	19	56	80%
**9 DB	24	24	41	87.5%

Note. Nearest standard RETMA value may be used. Use only non-inductive resistors.

Note. These pads are suitable for SSB, radio-telegraph, and AM operation, however, steady full level C. W. excitation should be avoided except for very brief test periods as the dissipation rating of the resistors will be exceeded.

SECTION V
SERVICE OR OPERATING QUESTIONS

5-1. For further information regarding operation or servicing of any Hallicrafters equipment, contact your Hallicrafters dealer. The Hallicrafters Company maintains an extensive system of Authorized Service Centers where any required service will be performed promptly and efficiently at a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown at the right. For the location of the one nearest you, consult your dealer or telephone directory. Make no service shipments to the factory as the Hallicrafters Company will not accept the responsibility for unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



92X1401-C

5-2. WARNING - HIGH VOLTAGE.

D.C. voltage in excess of 2000 volts and A.C. voltage in excess of 4000 volts is present in this equipment.

Do not attempt to measure voltages with hand held test leads nor attempt to service this unit with the plate supply on. In addition to the danger of serious injury or death from the high voltage supply, serious radio frequency burns can be caused by coming in contact with, or close proximity to the plate and output circuits.

An A.C. interlock is installed on the cover for your protection. Do not attempt to defeat its purpose. Also, a bleeder circuit is provided to discharge the high voltage filter condenser. However, we strongly recommend the use of a grounding rod to short the high voltage circuit to the chassis before any servicing is attempted. USE EXTREME CAUTION IN WORKING WITH THIS EQUIPMENT.

SECTION VI
GENERAL SPECIFICATIONS

Dimensions, overall.. 20" w X 12 3/8" h X 17 1/8" d.
Dimensions, front panel ..... 8 3/4" h X 19" w.
Mode of operation ..... Class AB1 linear power amplifier
Power Consumption ..... 1450 watts @ 117 volts, 60 cycles A.C.
Plate power input-S.S.B. ..... 1000 watts P.E.P.
Plate power input-D.S.B. (A.M.)..... 775 watts
Plate power input-C.W. ..... *1000 watts
Power Output-S.S.B..... 625 watts P.E.P.
Drive Power-S.S.B. ..... 8 watts P.E.P.
Drive Power-D.S.B. (A.M.)..... 6 watts
Drive Power-C.W..... 6.5 watts
Weight, net.....123 lbs.
Weight, shipping .....129.5 lbs.

*Efficiency may be increased on C.W. by reducing idling plate current to 100 ma.

Normal idling plate current for S.S.B. and D.S.B. (A.M.) will be 280 ma. unless otherwise specified on shipping tag. Idling plate current should not be allowed to exceed 300 ma as tubes plate dissipation is 600 w = 2000 v X 300 ma. This is controlled by bias adjustment on rear of chassis.

6-1. SCREEN CURRENT.

Screen current will vary from band to band and under different conditions of loading. A special meter scale has been provided to read this current and the proper range will be selected by placing the meter switch in "Screen" position. It is entirely normal for the screen current to read "0" or even negative in operation. Meter readings from -15 ma. to +15 ma. are to be considered normal.

6-2. NEUTRALIZATION.

This unit has been carefully neutralized at the factory and no further adjustment will be necessary except as a result of repair procedures. Improper neutralization will be indicated if maximum power output does not coincide with minimum plate current as the "Plate Tuning" condenser is tuned through resonance.

The following procedure is recommended if any adjustment is found necessary.

1. Follow tuning procedure as described under C.W. operation on 10 meters.
2. Set "High Voltage" switch to "OFF" position.
3. Short 4CX300A plate cap to chassis with grounding rod (Remove after 30 seconds).
4. Disconnect 50 ohm load from output.
5. Connect sensitive null indicator across 50 ohm output circuit.
6. Apply C.W. excitation (HIGH VOLTAGE OFF) until reading is indicated on null indicator.

Note. Do not exceed 20 watts P.E.P. input.

7. Adjust "Neutralizing Tab" by bending slightly toward or away from 4CX300A plate connector

assembly until minimum reading is obtained.

Note. Maintain at least one quarter inch spacing between tab and plate connector assembly to prevent arcing.

8. Remove excitation.

9. Remove null indicator and connect 50 ohm load.

6-3. CLEANING.

Equipment that is continously power ventilated may tend to collect dust within the unit depending upon the content of the air being circulated. The circuitry should be kept clean as any accumulation of dust in the high voltage or R.F. areas may cause arcing and consequent damage. This applies to both the top side and underside of the chassis.

The preferred method of cleaning is the use of a vacuum cleaner while dusting with a clean brush. Do not use solvents for cleaning.

6-4. LUBRICATION.

The blower will require one or two drops of oil in each of the oilers approximately once every six months under normal use. Any good grade of household oil may be used. The oilers are located at top and bottom of blower motor housing on side facing the plate tank coils.

6-5. 4CX300A TUBE REPLACEMENT
(Caution - High Voltage)

Special provisions have been made for equalization of the load on the two parallel operated tubes, thus increasing tube life and output power.

Should tube replacement be found necessary, the following steps are recommended.

Note. No excitation is to be used during any of following steps. The load should be connected to the 50 ohm output.

1. Remove the defective tube from socket and install remaining tube in upper socket. (No tube in lower socket.)

2. Adjust bias control on rear of chassis until "Plate" reads 500 MA.

   Do not keep voltage applied more than 30 seconds to prevent tube damage.

3. Remove tube from socket and install new tube in same socket. If plate current reads above 500 MA., readjust bias control until 500 MA. reading is obtained.

4. Select tube which has lowest "Plate Current" reading and install it in the lower socket. (No tube in upper socket.)

5. Adjust slider on R26 until "Plate Current" on lower tube reads 500 MA.

   Do not keep voltage applied more than 30 seconds.

6. Install remaining tube in upper socket and adjust bias control for normal idling current (280 MA).

Note. Resistor (R25) adjusts screen voltage on upper tube. Resistor (R26) adjusts screen voltage on lower tube.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number

RESISTORS

R-1	Variable, 5k ohms, 25w, ww	25B1424
R-2	47 ohms, 10%, 2w, Comp	23X42X470K
R-3, 4, 5	47, 000 ohms, 10%, 2w, Comp	23X42X473K
R-6	50, 000 ohms, 75w, ww	24A1149
R-7	35, 000 ohms 50w ww	24A1169
R-8	Meter Shunt	----------
R-9	100 ohms, 5%, 25w, ww	24-1139
R-10	22, 000 ohms, 10%, 1w, Comp	23X30X223K
R-11, 12	47 ohms, 1w, Comp Part of L12 & L13 (Parasitic Chokes)	----------
R-13	7, 000 ohms, 10w, ww	24BG702E
R-14, 15, 16, 17, 18, 19	6.8 ohms, 10%, 1/2w, Comp	23X20X6R8K
R-20, 21	10 ohms, 10%, 1/2w, Comp	23X20X100K
R-22	50 ohms, 5%, 5w, ww Part of L14 (Parasitic Choke)	----------
R-23, 24	3.3 ohms, 10%, 1/2w, Comp	23X20X3R3K
R-25, 26	10, 000 ohms, 10w, ww	24A1168

CAPACITORS

C-1, 2, 12, 13, 14, 15, 16, 17	.01 mfd 500V, Ceramic disc	47A354
C-3	60 mfd -10 +50%, 450V DCW, Electrolytic	45A417
C-4	16 mfd -10 +50%, 450V DCW, Electrolytic	45A418
C-5	10 mfd 2500V, Paper	46C634
C-7	.005 mfd 20% 500V, Ceramic disc	47A442
C-6, 8, 9, 10, 11	1500 mmfd 500V, Ceramic feed-thru	47A602
C-18	47 mmfd. 10% 500V, Mica	47X20A470K
C-19	Variable (Grid tuning, 9-190 mmfd)	48C397
C-20A, 20B	Variable (Final tuning, 15-190 mmfd)	48D393
C-21	330 mmfd x 5% Dur-mica ceramic	47CB19F331J5
C-22	.001 mfd x 5, 000 W.V.D.C.	47B556
C-23, 24, 25	Two 100 mmfd in parallel	47B399
C-26	100 mmfd Loading	47B399
C-27	Three Capacitors in parallel: 47A705 & One 50 mmfd and two 100 mmfd	47B399
C-28	.003 mfd x 3, 000 W.V.D.C., ceramic	47A707
C-29	TAB, Neutralizing	76B1919

CHOKES AND COILS

L-1A	Coil, Plate (10-11 MTR.)	51B2262
L-1B	Coil, Plate (15-20 MTR.)	51B2263
L-1C	Coil, Plate (40-80 MTR.)	51B2264
L-2	Coil, Grid (80 MTR.)	51B2277
L-3	Coil, Grid (40 MTR.)	51B2276
L-4	Coil, Grid (20 MTR.)	51B2275

CHOKES AND COILS (cont)

L-5	Coil, Grid (15 MTR.)	51B2274
L-6	Coil, Grid (10 MTR.)	51B2273
L-7, 8	Choke, A.C. Line	53B428
L-9	Choke, Swinging (H.V.)	56-262
L-10, 11, 18	Choke, 10 uh	53A445
L-12, 13	Choke, Parasitic	53A421
L-14	Choke, Parasitic	53A422
L-15	Choke, R.F. Plate	53-441
L-16	Choke, R.F. Safety	53B444
L-17	Choke, Fil.	53A460

SWITCHES

SW-1, 2, 4	Switch, Toggle (SPST)	60A281
SW-3	Switch, A.C. Inter-lock	60B754
SW-5	Switch, Rotary (Meter)	60-824
SW-6A	Switch, Wafer (Grid Coil)	62B113
SW-6B	Switch, Wafer (Grid Coil)	62B113
SW-7	Switch, Plate Ass'y	60C825
SW-8	Switch, Wafer (80 MTR Plate "C")	62B116

JACKS, PLUGS, SOCKETS AND CONNECTORS

J-1, 2	Connector, Coaxial	10A056
PL-1	Fan Cord and Plug	87B4989
PL-2	A.C. Line Cord and Plug	87B4978
	Socket, 4 pin ceramic	6A316
	Socket, 7 pin miniature	6A645
	Socket, (For 4CX300A Tube)	6A717
	Socket, Pilot	86A031
	Fuse post, with indicator	6A718
	Fuse post	6A719
SO-1	A.C. Receptacle (Fan)	10B015
	Pilot light, Jewel	86A302
	Connector, Anode	10B997

KNOBS

	Knob Assembly (Bandswitch)	15-1199
	Knob Assembly (Plate & Grid Tuning)	15-1201
	Knob Assembly (Meter)	15-1200

TUBES AND LAMPS

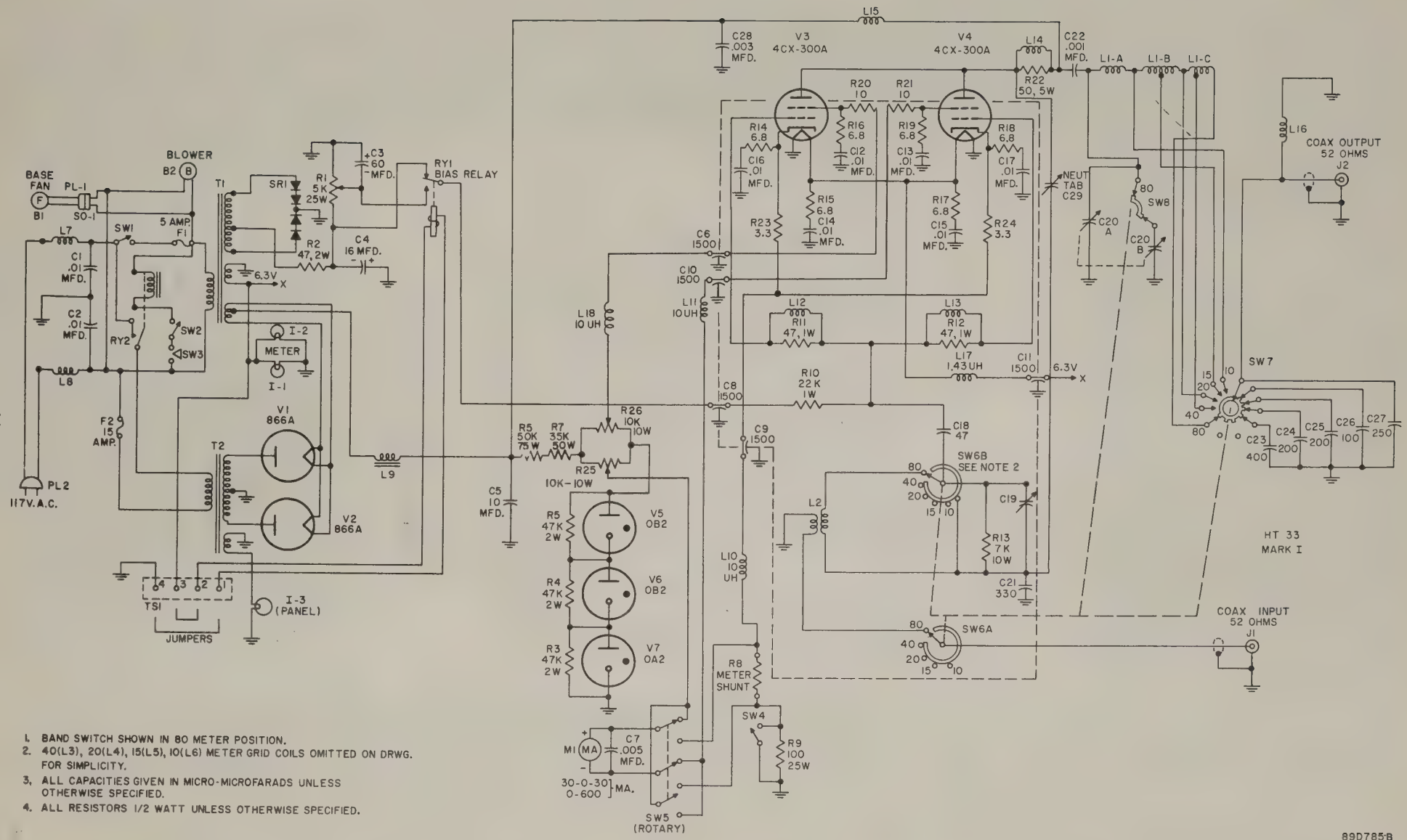
V-1, 2	866A; High Voltage Rectifier	90X866A
V-3, 4	4CX300A; Power Amplifier	90X4CX300A
V-5, 6	OB2; Voltage Regulator	90XOB2
V-7	OA2; Voltage Regulator	90XOA2
I-1, 2, 3	Lamp, Pilot	39A003

TRANSFORMERS

T-1	Transformer (Fil. & Bias)	52C482
T-2	Transformer (Plate)	52-486

MISCELLANEOUS

	Bracket, Escutcheon mtg.	67A4393
	Bracket, Fan mtg.	67B4182
	Bracket, Gang mtg.	67B4397
	Bracket, Meter mtg.	67B4619
	Bracket, Motor mtg.	67B4380
	Bracket, Resistor mtg.	67A4612
	Bracket, Switch (Safety)	67B4725
	Bushing, panel	77A1474
	Cabinet	66E1633
	Cabinet base assembly	66E1618
	Cabinet, Cover	66E1487
	Chimney (For P.A. Tubes)	8A3719
	Clamp, Motor mtg.	76B1830
	Connector, Hood	10B055
	Cover, Side (R.F. Chassis)	66C1478
	Cover, Top (R.F. Chassis)	66C1479
	Clip (H.V. Cap)	76B008
	Duct, Air	66C1475
	Duct, Air Scoop	66C1488
	Escutcheon	7E675
	Fan Blade	80B305
	Fan Motor	20A088
F-1	Fuse, 5 amp, 250V, 3 AG	39A460
F-2	Fuse, 15 amp, 250V, 3AB	39A441
	Gear, Miter	26A568
	Heat Shield	63D2581
	Index Plate	62-114
	Insulator, Coil bracket	8B3983
	Insulator, Coil clamp	8B3982
	Insulator, Feed-thru	8A1014
	Insulator, Feed-thru	8A1015
	Insulator, Mtg. (Grid Capacitor)	8A3707
	Insulator, Post	8A999
	Insulator, Stand off	8A1016
	Instruction Book	94X1670
	Medallion "H"	7A669
M-1	Meter (30-0-30) (0-600 MADC)	82-327
	Motor and Blower Assembly	20D140
	Panel, Front	68D545
	Plate, Reinforcing	63A334
	Post (latch)	11A226
SR-1	Rectifier, Selenium (65 MA, 130V)	27A243
RY-1	Relay, Bias	21B298
RY-2	Relay, Primary Control	21B309
	Rubber Foot	16A029
	Screen, Blower	7B709
	Screen, Meter	7B706
	Shaft, Band Selector	74A1372
	Socket and Bracket Assembly	6B727
	Strap, Plate Tank, long	63-2613
	Strap, Plate Tank, short	67-4676
	Terminal Board, four contact	88B1412



1. BAND SWITCH SHOWN IN 80 METER POSITION.
2. 40(L3), 20(L4), 15(L5), 10(L6) METER GRID COILS OMITTED ON DRWG. FOR SIMPLICITY.
3. ALL CAPACITIES GIVEN IN MICRO-MICROFARADS UNLESS OTHERWISE SPECIFIED.
4. ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED.

Figure 8. Chassis Schematic

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

1-2. TVI SUPPRESSION.

Every consideration has been given to possible local TVI problems in the design of the HT-33. Circuitry has been used that discourages harmonic generation. A low pass filter has been included in series with the AC power leads. The enclosed metal cabinet greatly aids in shielding. A screen has been provided over the meter opening.

1-3. ADDITIONAL FEATURES.

Many additional features have been included for reliability and ease of operation. Bridge neutralization is used to insure stable operation on all bands. Screen and cathode current are easily read on a large dual scale illuminated meter. Meter switching is accomplished by a two position selector switch on the front panel. The entire unit is power ventilated by means of a built in blower and base fan to insure adequate cooling under all operating conditions. A red jewel indicator is used to indicate that primary voltage is applied to the plate supply transformer. All bandswitching is accomplished by a single selector knob.

SECTION II
INSTALLATION

2-1. Unpacking. Check all shipping tags and labels for further instructions before removing or destroying. Check to see that base fan blades turn freely.

Location. The HT-33 should be located reasonably close to the exciter unit.

It is very important that the HT-33 be placed in such a manner that complete air circulation will be had on all sides as well as top and bottom. Under no circumstance should any object be placed on top of this unit.

2-2. Power Source Requirements. The HT-33 is designed for 117 volt 60 cycle AC operation. The source should be capable of supplying 1450 watts with good regulation at the specified operating voltage.

2-3. Rack Mounting. Removal from Cabinet.

If rack mounting is desired, the unit must be removed from the cabinet.

Step #1. Remove one screw from interlock switch bracket and swing switch and bracket into horizontal position.

Step #2. Remove air scoop from blower. This is held in place by three sheet metal screws around blower intake opening.

Step #3. Remove upper and lower panel screws on each side of front panel.

Step #4. Remove five chassis mounting bolts at bottom rear of cabinet.

Step #5. Remove base fan plug.

Step #6. Slide chassis forward from cabinet.

The slots at the edges of the front panel are properly spaced to accommodate mounting screws in a standard 19 inch rack.

The blower air scoop should be replaced if rack mounting is used to prevent recirculation of warm air from the amplifier tubes.

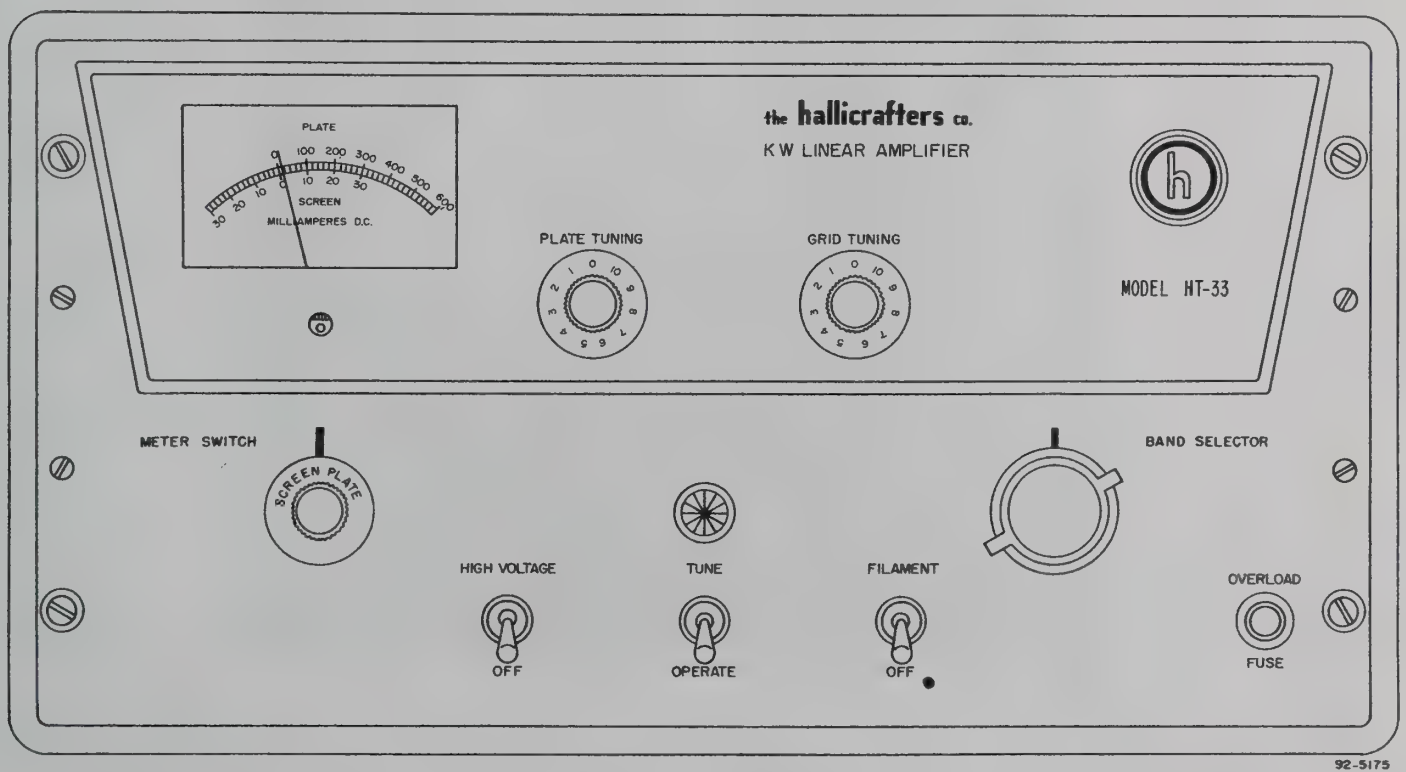


Figure 2. Front Panel View

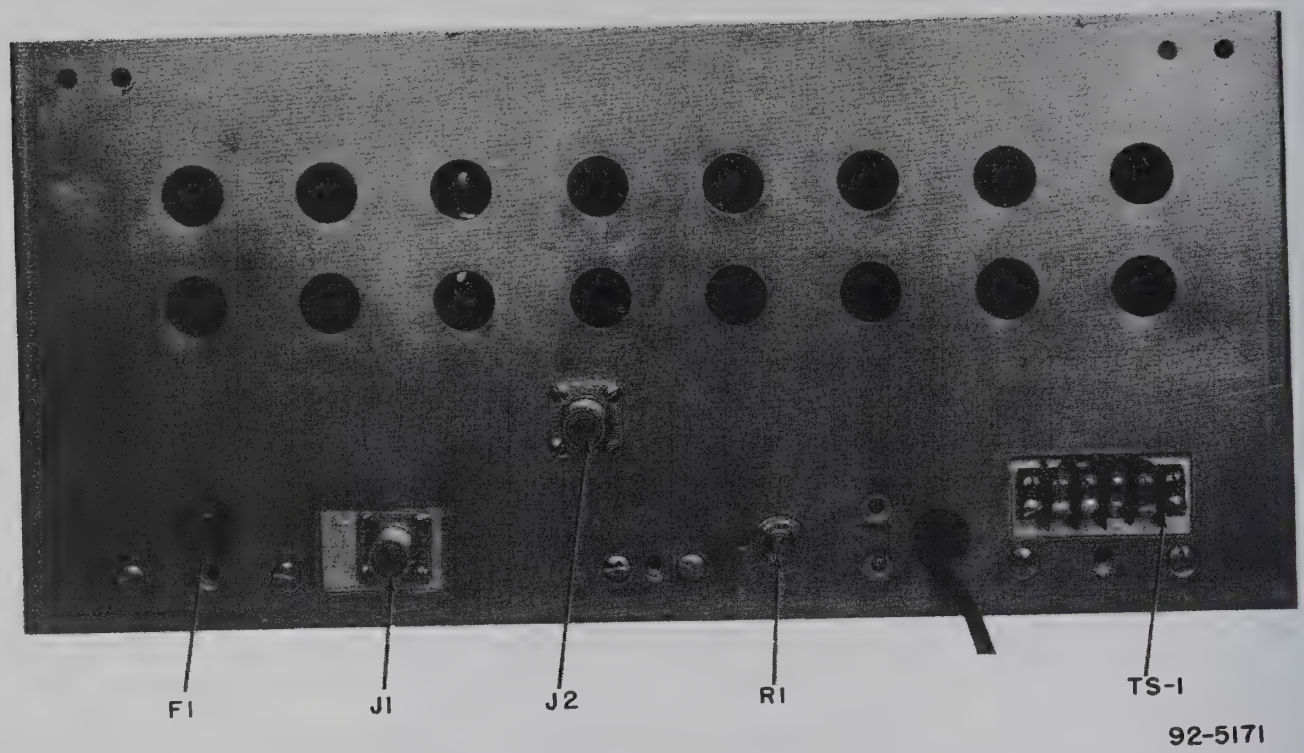


Figure 3. Chassis-Rear View

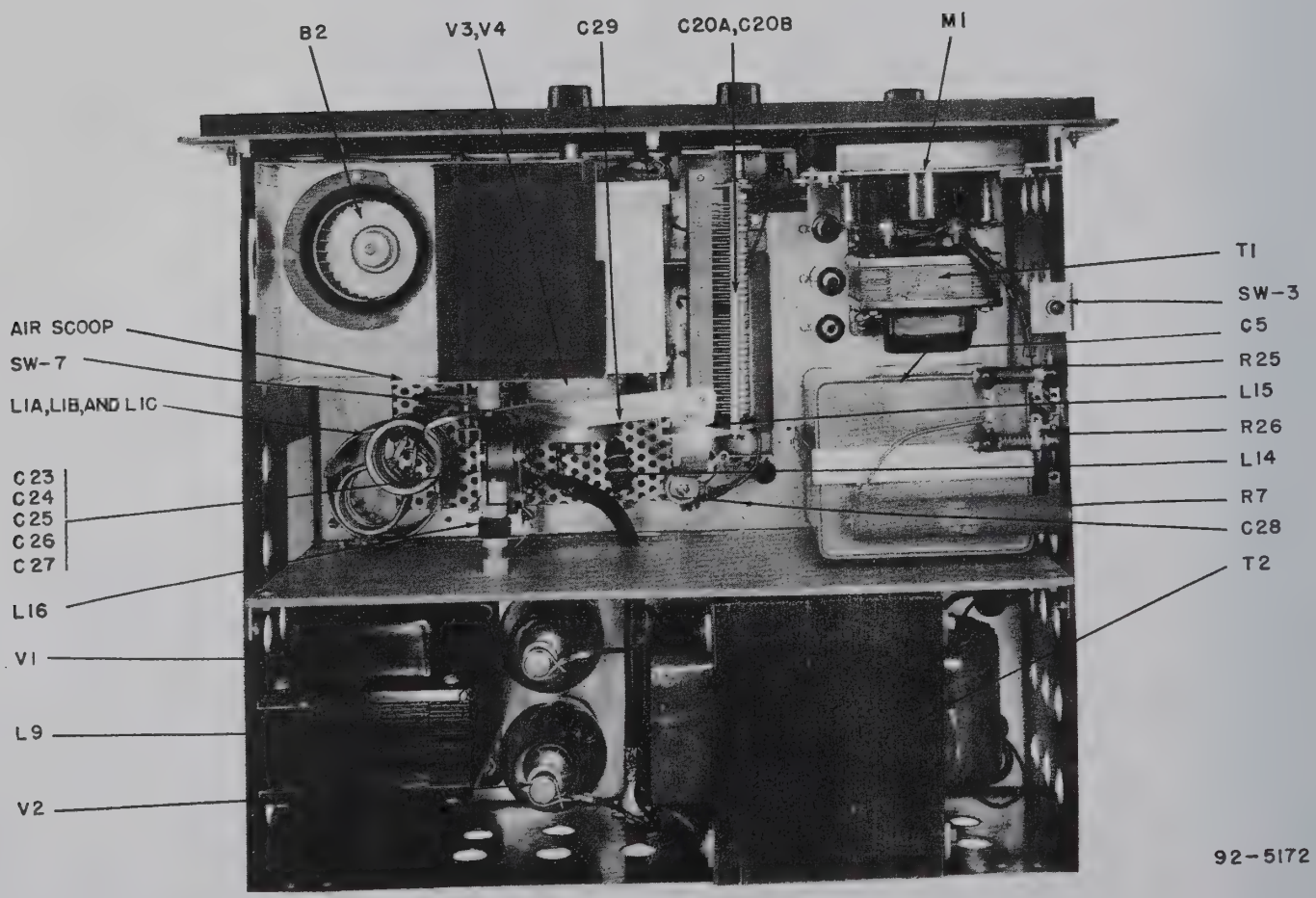


Figure 4. Chassis-Top View

SECTION III
CONTROLS

3-1. Function and use of operating controls. See Figure 2.

Name of Control	Type	Function and Use
Filament Sw.	Toggle (S.P.S.T.)	Connected in series with power line. Used to energize filament, bias, fan, and blower circuits or to disable entire unit.
High Voltage Sw.	Toggle (S.P.S.T.)	Used to energize relay in primary of plate supply transformer.
Meter Sw.	Rotary (2 position)	Connects the meter to read screen current or cathode current. Separate meter scales are provided for screen and cathode readings. The setting of the switch automatically switches in the shunt for reading Cathode current.
Band Selector	Ganged Rotary (5 position)	Selects correct grid and plate coils for each band and switches in correct capacity in Pi network. Also switches in additional stator section of plate tank condenser on 80 meters.
Tune Sw.	Toggle (S.P.S.T.)	Reduces power output during tune up by switching in 100 ohm resistor in cathode circuit thus increasing bias on the tubes.
Grid Tuning	Variable Capacitor	Resonates the grid circuit. Used in conjunction with the exciter output adjustments to load the grid circuit.
Plate Tuning	Variable Capacitor (Split Stator)	Resonates the plate circuit. One section used for 40-20-15-11-10 meters, both sections are used in parallel for 80 meter operation.

3-2. Input Connector. The input connector, located on the rear of the chassis, will mate with an Amphenol type 83-1SP coax connector (not supplied with amplifier). Excitation from the exciter unit should be applied through this connector. The input is designed to be fed from a 50 ohm unbalanced line with very low V.S.W.R.

Caution. Input drive should never be allowed to exceed 20 watts P.E.P. or serious damage will result to the input circuit. It should be remembered that 8 watts P.E.P. will drive this unit to the legal limit. Even less excitation is required for A.M. and C.W.

Do not operate as linear amplifier with switch in "Tune" position as the linearity will be affected.

3-3. Output Connector. The output connector, located on the rear of the chassis will mate with an Amphenol type 83-ISP coax connector (not supplied). The amplifier is designed to work into a 50 ohm Non-reactive load.

SECTION IV
TUNING

4-1. General. The general tuning procedure's are similar to those for any power amplifier. Additional considerations are necessary, however, to insure linear operation and to prevent overloading during tune up procedure. A mismatched load or excessive excitation may result in non-linearity and consequently a high distortion product level being radiated. Initial tuning should be made at the desired frequency using C.W. excitation. Final adjustments for other types of operation will then be simplified. A description of the function of the operating controls is given in Section III. Also refer to Figure 2. Tuning procedures for C.W., S.S.B. and A.M. operation are as follows:

4-2. TUNING PROCEDURE - GENERAL.

The following steps apply to all types of operation.

1. Set "Filament" switch in "OFF" position.
2. Set "High Voltage" switch in "OFF" position.
3. Set "Tune" switch in "Tune" position.
4. Set "Meter" switch in "Plate" position.
5. Set "Band Selector" switch to desired band.
6. Connect 50 ohm load to "Output" coax receptacle.
7. Connect exciter output coax to "Input" coax receptacle.
8. Plug HT-33 A.C. line cord into receptacle capable of delivering a minimum of 1450 watts at 117 volts, 60 cycles.
9. Place "Filament" switch in "ON" position and allow a 10 minute warm up period.

(Note. Blower and base fan should always be in operation when "Filament" switch is on. High voltage should never be applied if either is inoperative.)

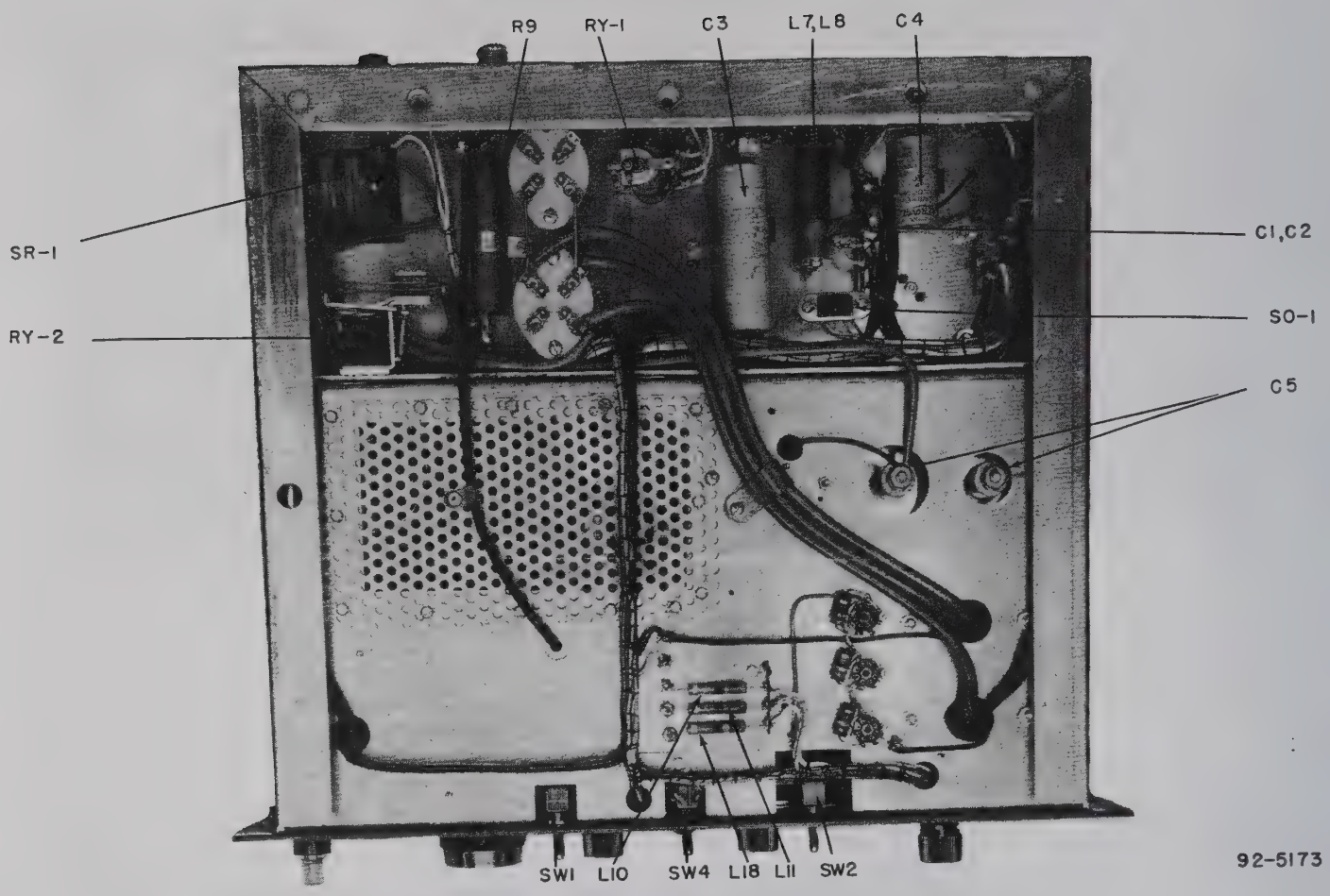


Figure 5. Chassis-Bottom View

4-3. TUNE UP FOR C.W. OPERATION.

1. Place "High Voltage" switch in "ON" position.
2. Carefully apply a small amount of C.W. excitation (approx. 2 watts P.E.P.) and resonate grid circuit of HT-33 by observing increase in meter current.
3. Resonate plate circuit by tuning "Plate Tuning" condenser for minimum plate current.
4. Place "Tune" switch in "Operate" position.
5. Carefully increase excitation to desired input.

Note. 500 ma. will give one Kilowatt input and is the absolute maximum (2000 Volts X 500 Ma.).

4-4. TUNE UP FOR SSB OPERATION.

1. Proceed as described for C.W. operation.
2. Remove C.W. excitation.
3. Place exciter in S.S.B. position, and gradually increase gain control while speaking into microphone until voice peaks show tendency to flatten, as viewed on oscilloscope connected across 50 ohm output. Decrease exciter gain control slightly until voice peaks no longer show any tendency to flatten.

Caution. Do not use meter as voice peak indicator as the meter does not follow the speech plate current swing and therefore in no way indicates true peak power on S.S.B.

Without excitation, idling plate current will normally run between 200-300 ma. for S.S.B. and D.S.B. (See specifications for C.W. operation.)

4-5. TUNE UP FOR DOUBLE SIDE BAND WITH CARRIER. (A.M.)

1. Proceed as described for C.W. operation.
2. Remove C.W. excitation.
3. Place exciter in D.S.B. position and gradually increase excitation until voice peaks show tendency to flatten as viewed on an oscilloscope connected across 50 ohm output. Back off excitation slightly

until voice peaks no longer show any tendency to flatten.

Caution. Any transmitter is subject to spurious radiation if improperly tuned or if the modulation limits are exceeded. Continuous monitoring of the output by means of an oscilloscope is an excellent method of insuring compliance with FCC regulations. This is true both for S.S.B. and D.S.B. operation. For test checks, the "Two-Tone Test" method is highly recommended. Consult "Single Side Band For The Radio Amateur", an A.R.R.L. publication for complete information. (Single tone for D.S.B. with carrier.)

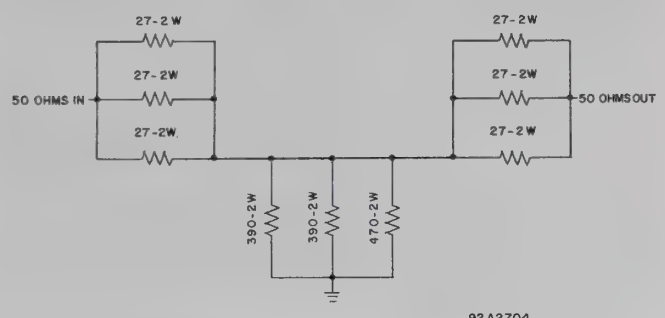


Figure 6. HT-30 50 ohm Pad

* A 3DB pad is recommended for use between a HT-30 SSB exciter and the HT-33. The pad may be conveniently wired in a metal box (6" x 2" x 2") with a removable cover. Amphenol SO-239 receptacles should be installed at each end.

4-6. Note. Some types of SSB exciter units may be optimistically or incompletely rated with respect to their output capabilities. In order to obtain the stability necessary to properly drive a high power linear amplifier, it may be necessary to provide swamping of a portion of the exciter output signal in the coupling between the exciter output and the HT-33 input. As much swamping should be used as possible as this will improve the dynamic stability of the exciter. Also, swamping will improve carrier suppression and unwanted side band figures as these are rated at full exciter output. Be sure that the exciter is linear at the chosen operating level.

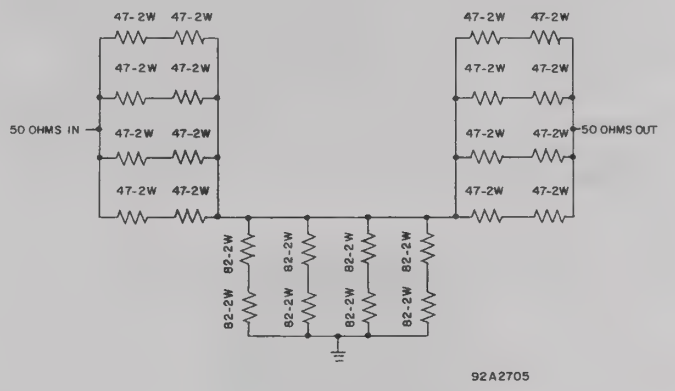
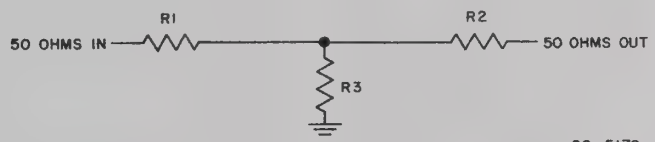


Figure 7. HT-32 50 ohm Pad

** A 9 DB pad is recommended for use between a HT-32 SSB exciter and the HT-33. The pad may be conveniently wired in a metal box (8" x 3" x 3") with a removable cover. Amphenol SO-239 receptacles should be installed at each end.

Typical values for a 50 ohm pad are as follows;



Attenuation	R1-Ohms	R2-Ohms	R3-Ohms	Power Loss
2 DB	6	6	215	36%
*3 DB	9	9	142	50%
5 DB	14	14	82	66%
7 DB	19	19	56	80%
**9 DB	24	24	41	87.5%

Note. Nearest standard RETMA value may be used. Use only non-inductive resistors.

Note. These pads are suitable for SSB, radio-telegraph, and AM operation, however, steady full level C. W. excitation should be avoided except for very brief test periods as the dissipation rating of the resistors will be exceeded.

SECTION V
SERVICE OR OPERATING QUESTIONS

5-1. For further information regarding operation or servicing of any Hallicrafters equipment, contact your Hallicrafters dealer. The Hallicrafters Company maintains an extensive system of Authorized Service Centers where any required service will be performed promptly and efficiently at a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown at the right. For the location of the one nearest you, consult your dealer or telephone directory. Make no service shipments to the factory as the Hallicrafters Company will not accept the responsibility for unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



92X1A01-C

5-2. WARNING - HIGH VOLTAGE.

D.C. voltage in excess of 2000 volts and A.C. voltage in excess of 4000 volts is present in this equipment.

Do not attempt to measure voltages with hand held test leads nor attempt to service this unit with the plate supply on. In addition to the danger of serious injury or death from the high voltage supply, serious radio frequency burns can be caused by coming in contact with, or close proximity to the plate and output circuits.

An A.C. interlock is installed on the cover for your protection. Do not attempt to defeat its purpose. Also, a bleeder circuit is provided to discharge the high voltage filter condenser. However, we strongly recommend the use of a grounding rod to short the high voltage circuit to the chassis before any servicing is attempted. USE EXTREME CAUTION IN WORKING WITH THIS EQUIPMENT.

SECTION VI
GENERAL SPECIFICATIONS

Dimensions, overall	20" w X 12 3/8" h X 17 1/8" d.
Dimensions, front panel	8 3/4" h X 19" w.
Mode of operation	Class AB1 linear power amplifier
Power Consumption	1450 watts @ 117 volts, 60 cycles A.C.
Plate power input-S.S.B.	1000 watts P.E.P.
Plate power input-D.S.B. (A.M.)	775 watts
Plate power input-C.W.	*1000 watts
Power Output-S.S.B.	625 watts P.E.P.
Drive Power-S.S.B.	8 watts P.E.P.
Drive Power-D.S.B. (A.M.)	6 watts
Drive Power-C.W.	6.5 watts
Weight, net	123 lbs.
Weight, shipping	129.5 lbs.

*Efficiency may be increased on C.W. by reducing idling plate current to 100 ma.

Normal idling plate current for S.S.B. and D.S.B. (A.M.) will be 280 ma. unless otherwise specified on shipping tag. Idling plate current should not be allowed to exceed 300 ma as tubes plate dissipation is 600 w = 2000 v X 300 ma. This is controlled by bias adjustment on rear of chassis.

6-1. SCREEN CURRENT.

Screen current will vary from band to band and under different conditions of loading. A special meter scale has been provided to read this current and the proper range will be selected by placing the meter switch in "Screen" position. It is entirely normal for the screen current to read "0" or even negative in operation. Meter readings from -15 ma. to +15 ma. are to be considered normal.

6-2. NEUTRALIZATION.

This unit has been carefully neutralized at the factory and no further adjustment will be necessary except as a result of repair procedures. Improper neutralization will be indicated if maximum power output does not coincide with minimum plate current as the "Plate Tuning" condenser is tuned through resonance.

The following procedure is recommended if any adjustment is found necessary.

1. Follow tuning procedure as described under C.W. operation on 10 meters.
2. Set "High Voltage" switch to "OFF" position.
3. Short 4CX300A plate cap to chassis with grounding rod (Remove after 30 seconds).
4. Disconnect 50 ohm load from output.
5. Connect sensitive null indicator across 50 ohm output circuit.
6. Apply C.W. excitation (HIGH VOLTAGE OFF) until reading is indicated on null indicator.

Note. Do not exceed 20 watts P.E.P. input.

7. Adjust "Neutralizing Tab" by bending slightly toward or away from 4CX300A plate connector

assembly until minimum reading is obtained.

Note. Maintain at least one quarter inch spacing between tab and plate connector assembly to prevent arcing.

8. Remove excitation.

9. Remove null indicator and connect 50 ohm load.

6-3. CLEANING.

Equipment that is continously power ventilated may tend to collect dust within the unit depending upon the content of the air being circulated. The circuitry should be kept clean as any accumulation of dust in the high voltage or R.F. areas may cause arcing and consequent damage. This applies to both the top side and underside of the chassis.

The preferred method of cleaning is the use of a vacuum cleaner while dusting with a clean brush. Do not use solvents for cleaning.

6-4. LUBRICATION.

The blower will require one or two drops of oil in each of the oilers approximately once every six months under normal use. Any good grade of household oil may be used. The oilers are located at top and bottom of blower motor housing on side facing the plate tank coils.

6-5. 4CX300A TUBE REPLACEMENT
(Caution - High Voltage)

Special provisions have been made for equalization of the load on the two parallel operated tubes, thus increasing tube life and output power.

Should tube replacement be found necessary, the following steps are recommended.

Note. No excitation is to be used during any of following steps. The load should be connected to the 50 ohm output.

1. Remove the defective tube from socket and install remaining tube in upper socket. (No tube in lower socket.)

2. Adjust bias control on rear of chassis until "Plate" reads 500 MA.

   Do not keep voltage applied more than 30 seconds to prevent tube damage.

3. Remove tube from socket and install new tube in same socket. If plate current reads above 500 MA., readjust bias control until 500 MA. reading is obtained.

4. Select tube which has lowest "Plate Current" reading and install it in the lower socket. (No tube in upper socket.)

5. Adjust slider on R26 until "Plate Current" on lower tube reads 500 MA.

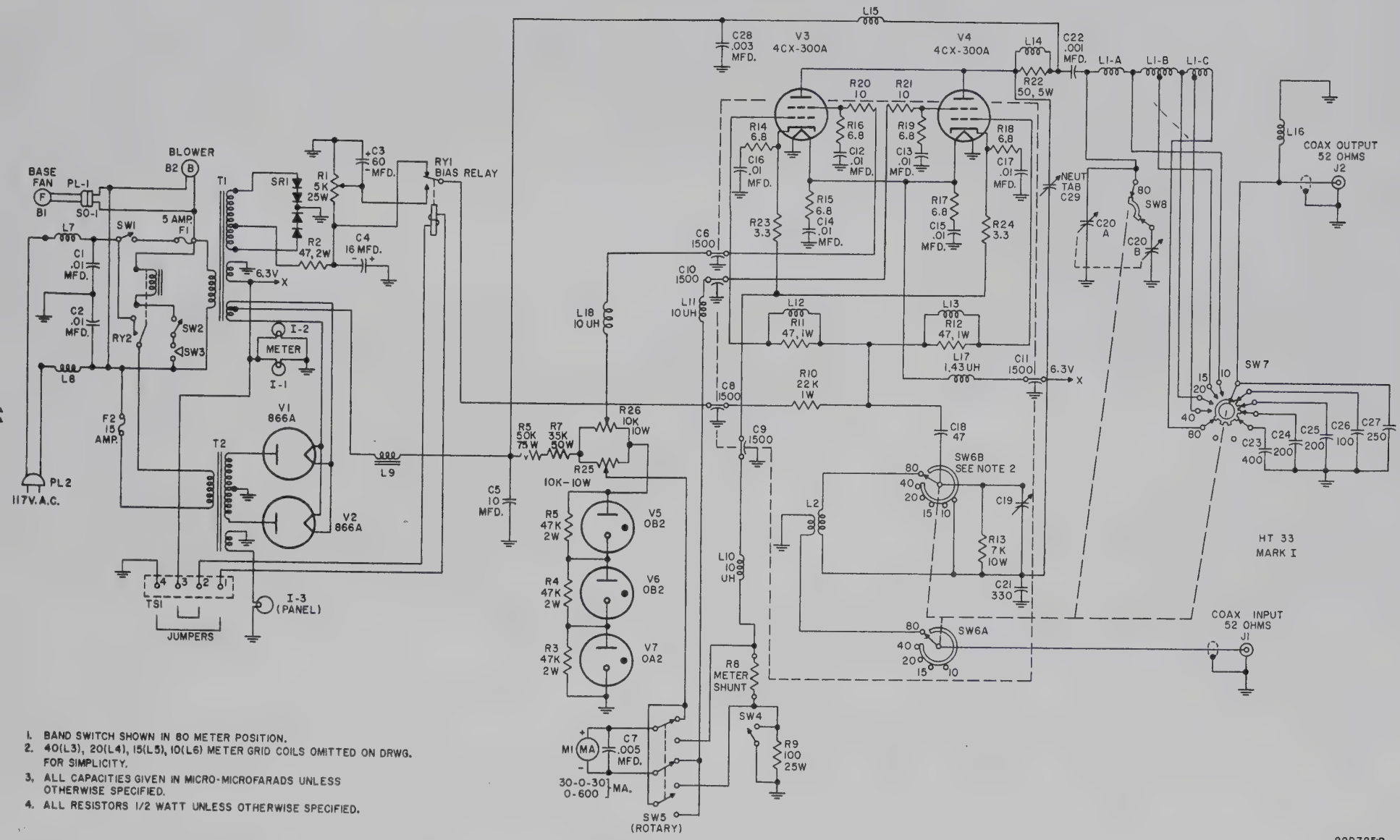
   Do not keep voltage applied more than 30 seconds.

6. Install remaining tube in upper socket and adjust bias control for normal idling current (280 MA).

Note. Resistor (R25) adjusts screen voltage on upper tube. Resistor (R26) adjusts screen voltage on lower tube.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	RESISTORS	
R-1	Variable, 5k ohms, 25w, ww	25B1424
R-2	47 ohms, 10%, 2w, Comp...	23X42X470K
R-3, 4, 5	47,000 ohms, 10%, 2w, Comp	23X42X473K
R-6	50,000 ohms, 75w, ww	24A1149
R-7	35,000 ohms 50w ww	24A1169
R-8	Meter Shunt	----------
R-9	100 ohms, 5%, 25w, ww	24-1139
R-10	22,000 ohms, 10%, 1w, Comp	23X30X223K
R-11, 12	47 ohms, 1w, Comp Part of L12 & L13 (Parasitic Chokes)	----------
R-13	7,000 ohms, 10w, ww	24BG702E
R-14, 15, 16, 17, 18, 19	6.8 ohms, 10%, 1/2w, Comp	23X20X6R8K
R-20, 21	10 ohms, 10%, 1/2w, Comp	23X20X100K
R-22	50 ohms, 5%, 5w, ww Part of L14 (Parasitic Choke)	----------
R-23, 24	3.3 ohms, 10%, 1/2w, Comp	23X20X3R3K
R-25, 26	10,000 ohms, 10w, ww	24A1168
	CAPACITORS	
C-1, 2, 12, 13, 14, 15, 16, 17	.01 mfd 500V, Ceramic disc	47A354
C-3	60 mfd -10 +50%, 450V DCW, Electrolytic	45A417
C-4	16 mfd -10 +50%, 450V DCW, Electrolytic	45A418
C-5	10 mfd 2500V, Paper	46C634
C-7	.005 mfd 20% 500V, Ceramic disc	47A442
C-6, 8, 9, 10, 11	1500 mmfd 500V, Ceramic feed-thru	47A602
C-18	47 mmfd. 10% 500V, Mica	47X20A470K
C-19	Variable (Grid tuning, 9-190 mmfd)	48C397
C-20A, 20B	Variable (Final tuning, 15-190 mmfd)	48D393
C-21	330 mmfd x 5% Dur-mica ceramic	47CB19F331J5
C-22	.001 mfd x 5,000 W.V.D.C.	47B556
C-23, 24, 25	Two 100 mmfd in parallel	47B399
C-26	100 mmfd Loading	47B399
C-27	Three Capacitors in parallel: One 50 mmfd and two 100 mmfd	47A705 & 47B399
C-28	.003 mfd x 3,000 W.V.D.C., ceramic	47A707
C-29	TAB, Neutralizing	76B1919
	CHOKES AND COILS	
L-1A	Coil, Plate (10-11 MTR.)	51B2262
L-1B	Coil, Plate (15-20 MTR.)	51B2263
L-1C	Coil, Plate (40-80 MTR.)	51B2264
L-2	Coil, Grid (80 MTR.)	51B2277
L-3	Coil, Grid (40 MTR.)	51B2276
L-4	Coil, Grid (20 MTR.)	51B2275
L-5	Coil, Grid (15 MTR.)	51B2274
L-6	Coil, Grid (10 MTR.)	51B2273
L-7, 8	Choke, A.C. Line	53B428
L-9	Choke, Swinging (H.V.)	56-262
L-10, 11, 18	Choke, 10 uh	53A445
L-12, 13	Choke, Parasitic	53A421
L-14	Choke, Parasitic	53A422
L-15	Choke, R.F. Plate	53-441
L-16	Choke, R.F. Safety	53B444
L-17	Choke, Fil.	53A460
	SWITCHES	
SW-1, 2, 4	Switch, Toggle (SPST)	60A281
SW-3	Switch, A.C. Inter-lock	60B754
SW-5	Switch, Rotary (Meter)	60-824
SW-6A	Switch, Wafer (Grid Coil)	62B113
SW-6B	Switch, Wafer (Grid Coil)	62B113
SW-7	Switch, Plate Ass'y	60C825
SW-8	Switch, Wafer (80 MTR Plate "C")	62B116
	JACKS, PLUGS, SOCKETS AND CONNECTORS	
J-1, 2	Connector, Coaxial	10A056
PL-1	Fan Cord and Plug	87B4989
PL-2	A.C. Line Cord and Plug	87B4978
	Socket, 4 pin ceramic	6A316
	Socket, 7 pin miniature	6A645
	Socket, (For 4CX300A Tube)	6A717
	Socket, Pilot	86A031
	Fuse post, with indicator	6A718
	Fuse post	6A719
SO-1	A.C. Receptacle (Fan)	10B015
	Pilot light, Jewel	86A302
	Connector, Anode	10B997
	KNOBS	
	Knob Assembly (Bandswitch)	15-1199
	Knob Assembly (Plate & Grid Tuning)	15-1201
	Knob Assembly (Meter)	15-1200
	TUBES AND LAMPS	
V-1, 2	866A; High Voltage Rectifier	90X866A
V-3, 4	4CX300A; Power Amplifier	90X4CX300A
V-5, 6	OB2; Voltage Regulator	90XOB2
V-7	OA2; Voltage Regulator	90XOA2
I-1, 2, 3	Lamp, Pilot	39A003
	TRANSFORMERS	
T-1	Transformer (Fil. & Bias)	52C482
T-2	Transformer (Plate)	52-486
	MISCELLANEOUS	
	Bracket, Escutcheon mtg.	67A4393
	Bracket, Fan mtg.	67B4182
	Bracket, Gang mtg.	67B4397
	Bracket, Meter mtg.	67B4619
	Bracket, Motor mtg.	67B4380
	Bracket, Resistor mtg.	67A4612
	Bracket, Switch (Safety)	67B4725
	Bushing, panel	77A1474
	Cabinet	66E1633
	Cabinet base assembly	66E1618
	Cabinet, Cover	66E1487
	Chimney (For P.A. Tubes)	8A3719
	Clamp, Motor mtg.	76B1830
	Connector, Hood	10B055
	Cover, Side (R.F. Chassis)	66C1478
	Cover, Top (R.F. Chassis)	66C1479
	Clip (H.V. Cap)	76B008
	Duct, Air	66C1475
	Duct, Air Scoop	66C1488
	Escutcheon	7E675
	Fan Blade	80B305
	Fan Motor	20A088
F-1	Fuse, 5 amp, 250V, 3 AG	39A460
F-2	Fuse, 15 amp, 250V, 3AB	39A441
	Gear, Miter	26A568
	Heat Shield	63D2581
	Index Plate	62-114
	Insulator, Coil bracket	8B3983
	Insulator, Coil clamp	8B3982
	Insulator, Feed-thru	8A1014
	Insulator, Feed-thru	8A1015
	Insulator, Mtg. (Grid Capacitor)	8A3707
	Insulator, Post	8A999
	Insulator, Stand off	8A1016
	Instruction Book	94X1670
	Medallion "H"	7A669
M-1	Meter (30-0-30) (0-600 MADC)	82-327
	Motor and Blower Assembly	20D140
	Panel, Front	68D545
	Plate, Reinforcing	63A334
	Post (latch)	11A226
SR-1	Rectifier, Selenium (65 MA, 130V)	27A243
RY-1	Relay, Bias	21B298
RY-2	Relay, Primary Control	21B309
	Rubber Foot	16A029
	Screen, Blower	7B709
	Screen, Meter	7B706
	Shaft, Band Selector	74A1372
	Socket and Bracket Assembly	6B727
	Strap, Plate Tank, long	63-2613
	Strap, Plate Tank, short	67-4676
	Terminal Board, four contact	88B1412



1. BAND SWITCH SHOWN IN 80 METER POSITION.
2. 40(L3), 20(L4), 15(L5), 10(L6) METER GRID COILS OMITTED ON DRWG. FOR SIMPLICITY.
3. ALL CAPACITIES GIVEN IN MICRO-MICROFARADS UNLESS OTHERWISE SPECIFIED.
4. ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED.

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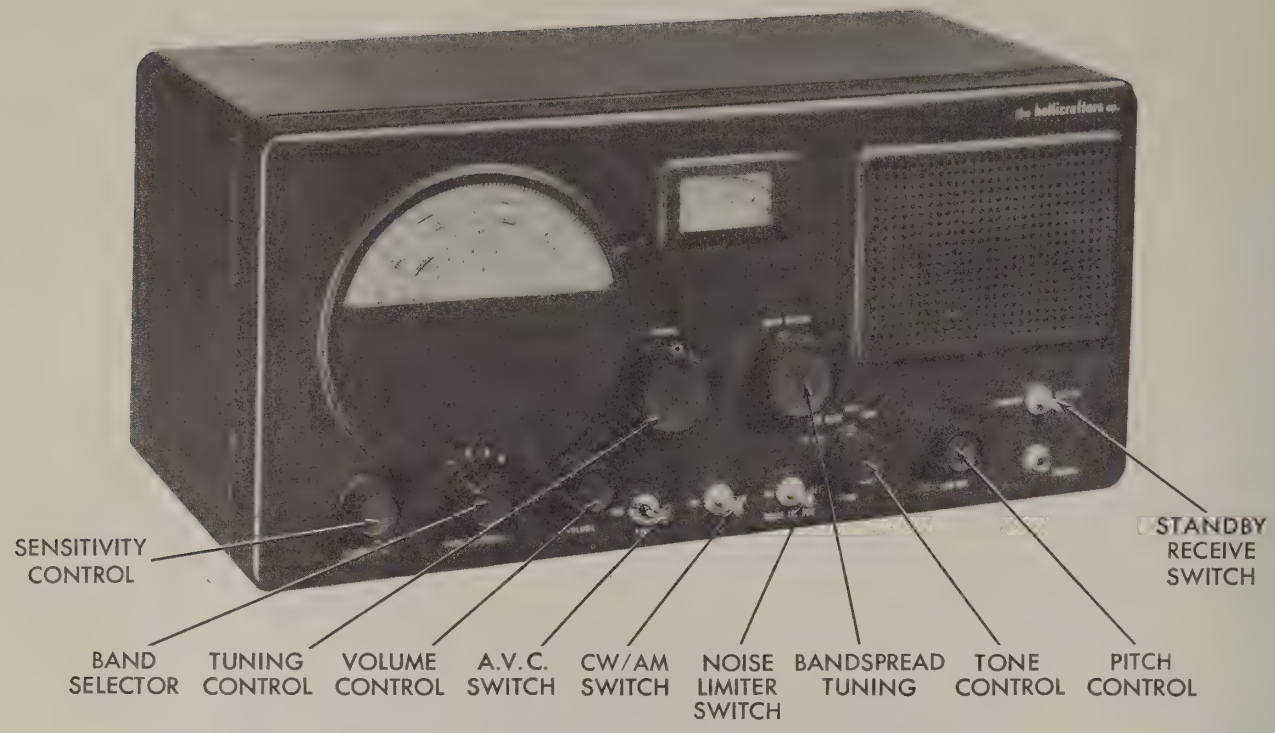
Figure 8. Chassis Schematic



S-40B
S-40BU

the hallicrafters co.

MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.



92X1140

FIG. 1 MODELS S-40B & S-40BU

DESCRIPTION

Models S-40B and S-40BU are sensitive superheterodyne communications receivers which provide reception of standard broadcast and foreign or domestic shortwave stations over four frequency ranges with continuous tuning from 540 KC (kilocycles) to 44 MC (megacycles). The receivers employ seven tubes plus rectifier and provide both AM and CW reception.

FREQUENCY COVERAGE

BAND	FREQUENCY RANGE
1	540 KC - 1680 KC
2	1680 KC - 5.4 MC
3	5.3 MC - 15.5 MC
4	15.5 MC - 44 MC

The four frequency ranges or bands are clearly indicated on the large main tuning dial. The locations of the amateur bands and foreign stations are indicated on the dial for convenient reference. Also on the main tuning dial is a special logging scale for use when logging frequencies of special interest.

The electrical BAND SPREAD control provides a vernier or fine tuning adjustment throughout the entire tuning range of the receiver.

Other special features included in the receiver are automatic volume control (AVC), automatic noise limiter and provision for headphone operation. The STANDBY/RECEIVE switch permits disabling of the receiver for standby periods, at the same time maintaining the tube heaters at operating temperature.

The receiver is housed in an attractive, well ventilated steel cabinet which has a length of 18-1/2 inches, a height of 8-1/2 inches and depth of 11 inches.

The S-40B is designed to operate from a 105-125 volt, 50-60 cycle AC power source. The S-40BU, a universal model of the S-40B, permits operation from 25-60 cycle AC sources at voltages ranging from 110 to 250 volts. The power consumption of each model is 75 watts.

INSTALLATION

UNPACKING Check all shipping tags and labels for instructions before removing or destroying them.

LOCATION - The receiver is equipped with rubber mounting feet for table top or shelf mounting. When locating the receiver, avoid excessively warm locations and recessed installations which prevent proper air circulation.

POWER SOURCE - The S-40B can be operated from a 105-125 volt, 50-60 cycle AC power outlet. The universal model, the S-40BU, is designed for operation from 115, 130, 150, 220 and 250 volt, 25-60 cycle AC sources. A selector switch, located on the power transformer, permits operation of the S-40BU at the line voltages shown. If in doubt as to the frequency and voltage rating of your power source, contact the local power company representative. Attempting to operate the receiver from sources of power not specified above may result in damage to the receiver.

> CAUTION - When operating the universal model, it is essential that the selector switch setting on the power transformer correspond to the operating line voltage before connecting the receiver to the AC power source.

ANTENNA - A three terminal strip marked A1, A2 and G, is provided on the rear apron of the chassis for antenna connection. Very satisfactory results can be obtained throughout the tuning range of the receiver with a conventional single wire antenna installation (see Fig. 2). In some instances, a short length of wire strung about the room may suffice. However, for improved reception of the higher frequency bands, it is recommended that a doublet antenna installation be employed (see Fig. 3). For further information concerning antennas refer to "ARRL ANTENNA HANDBOOK".

SINGLE WIRE ANTENNA - Connect a single wire antenna 50 to 100 feet long (including lead-in) to terminal A1 on the antenna terminal strip. Connect the jumper between terminals A2 and G. Erect the antenna as high as possible and free of surrounding objects. A ground wire connected between terminal G and a suitable ground such as a cold water pipe or outside ground rod may improve reception.

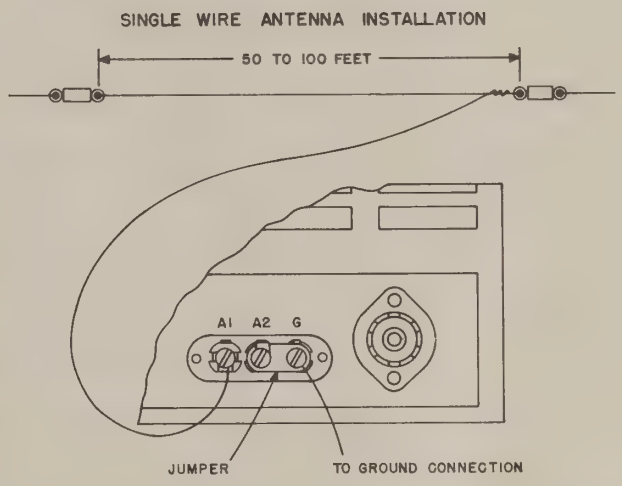


FIG. 2 SINGLE WIRE ANTENNA INSTALLATION

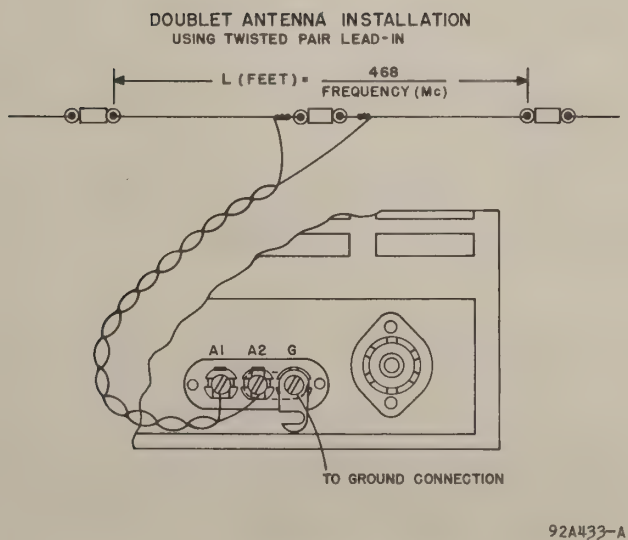


FIG. 3 DOUBLET ANTENNA INSTALLATION

DOUBLET ANTENNA - The overall length, in feet, of the doublet antenna may be determined by dividing 468 by the desired frequency in megacycles. A doublet antenna is somewhat directional broadside to its length and should be so oriented if maximum pickup from a given direction is to be expected.

When feeding the doublet antenna with twisted pair or a ribbon type transmission line, connect the transmission line to terminals A1 and A2 on the antenna terminal strip and disconnect the jumper between terminals A2 and G.

When using a coaxial transmission line, connect the inner conductor to terminal A1, the outer conductor to terminal A2 and place the jumper between terminals A2 and G.

OPERATION

Each control of this receiver performs a definite function that contributes to the outstanding reception capabilities. Full appreciation of the receiver is to be expected only after you have become familiar with each of the controls and the effect their operation has on the performance of the receiver. As an added feature for convenience, the control positions for standard broadcast reception are marked in red. The following use of the controls is recommended to obtain optimum performance from the receiver.

SENSITIVITY control — This control is normally set fully clockwise for maximum sensitivity. In some rare instances, strong local signals may overload the receiver input. Distortion, caused by this condition, can be eliminated by reducing the receiver sensitivity slightly.

BAND SELECTOR switch — This switch is used to select the desired band or frequency range. The frequencies covered by each position of the BAND SELECTOR are read directly from the main tuning dial scale which corresponds to the setting of the BAND SELECTOR switch.

VOLUME control — This control is used to regulate audio volume. Turning the control clockwise increases volume.

AVC switch — This switch, when set to the ON position, places the automatic volume control circuit in operation. The AVC circuit provides a constant audio output level over large variations in signal strength at the antenna. The AVC switch should be set at OFF for CW reception.

TUNING control — This control should be set for the desired station frequency after setting the BAND SELECTOR switch. Frequencies on all bands are shown in megacycles.

IMPORTANT - The main tuning dial calibration is correct only when the BAND SPREAD dial pointer is set at 0.

AM/CW switch — This switch, when set at CW, places the beat frequency oscillator (BFO) in operation making code signals audible. For AM reception, set the switch at AM.

BAND SPREAD control — This control functions to electrically spread out the crowded amateur and shortwave bands. Band spread tuning is not necessary on the broadcast band.

Band spread tuning is accomplished as follows: (1) Set the band spread dial pointer at 0 (2) Position the TUNING control for the high frequency end of the amateur band or range of frequencies to be covered and (3) Tune through the amateur band or frequency range with the BAND SPREAD control.

NOTE: It is possible to log shortwave stations by recording the settings of the main tuning and band spread logging scales.

NOISE LIMITER switch — This switch is normally set at OFF. Set the NOISE LIMITER switch at ON when severe electrical disturbances interfere with reception.

TONE control — This control attenuates the high audio frequencies to the extent required by various receiving conditions. In addition, it is used to turn the receiver on and off. In the AC OFF position, the power to the receiver is disconnected. For CW reception, set the TONE control at LOW.

PITCH CONTROL — This control is used to vary the pitch of the CW code signal when listening to amateur or commercial code stations and should be set for the tone most pleasing to the operator.

STANDBY/RECEIVE switch — This switch, normally set at RECEIVE, is particularly useful to the "ham" as it provides a means of placing the receiver in an inoperative condition for standby periods, at the same time maintaining the tube heaters at operating temperature. The receiver is inoperative when the switch is set at STANDBY.

HEADPHONE OPERATION - The PHONES jack, located on the front panel, permits the use of standard headphones with the receiver. The speaker is automatically disconnected when the headphone plug is inserted in the PHONES jack.

GENERAL SPECIFICATIONS

Tubes . . . . . Eight including one rectifier
Speaker . . . . . 5" PM
Voice Coil Impedance. . . . . 3.2 ohms
Antenna Input . . . . . For a 50-600 ohm line or single wire lead-in
Intermediate Frequency . . . . . 455 KC
Power Supply . . Model S-40B: 105-125 V. 50-60 cycle AC
. . Model S-40BU: 105-250 V. 25-60 cycle AC
Power Consumption . . . . . 75 watts

FREQUENCY COVERAGE

Band	Frequency Range	Reception
1	540 KC - 1680 KC	AM/CW
2	1680 KC - 5.4 MC	AM/CW
3	5.3 MC - 15.5 MC	AM/CW
4	15.5 MC - 44 MC	AM/CW

DIAL LAMP REPLACEMENT - Refer to Fig. 7 for the location of the dial lamps used in the receiver. To gain access to defective lamps, raise the hinged top cover of the cabinet. To make a dial lamp replacement, unclip the dial lamp socket from the mounting bracket. Replace defective lamps with 6-8 volt, 250 ma (blue bead) Mazda #44 pilot lamps.

RESTRINGING DIAL CORD - The dial drive system of the receiver consists of two separate string drives (1) main tuning dial drive and (2) band spread tuning dial drive. All restringing should be done with the main tuning and band spread gangs fully meshed.

MAIN TUNING DIAL DRIVE - Tie one end of an 16 inch length of 30 lb. test dial cord to the tension spring at position 1 on the main tuning capacitor drive pulley. Stretch the tension spring and follow the stringing procedure 1 through 4. At position 4, tie the cord securely to the spring.

BAND SPREAD DIAL DRIVE - Tie one end of a 24 inch length of 30 lb. test dial cord to the tension spring at position A on the band spread capacitor drive pulley. Stretch the tension spring and follow the stringing procedure A through G. At position G, tie the cord securely to the spring.

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 7. Raise the hinged top cover of the cabinet to gain access to all tubes. When installing a replacement tube, insert the center guide pin of the tube into the center hole of the tube socket, rotate the tube until the key on the guide pin drops into the notch in the socket hole and then push down until the base of the tube rests firmly on the socket. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

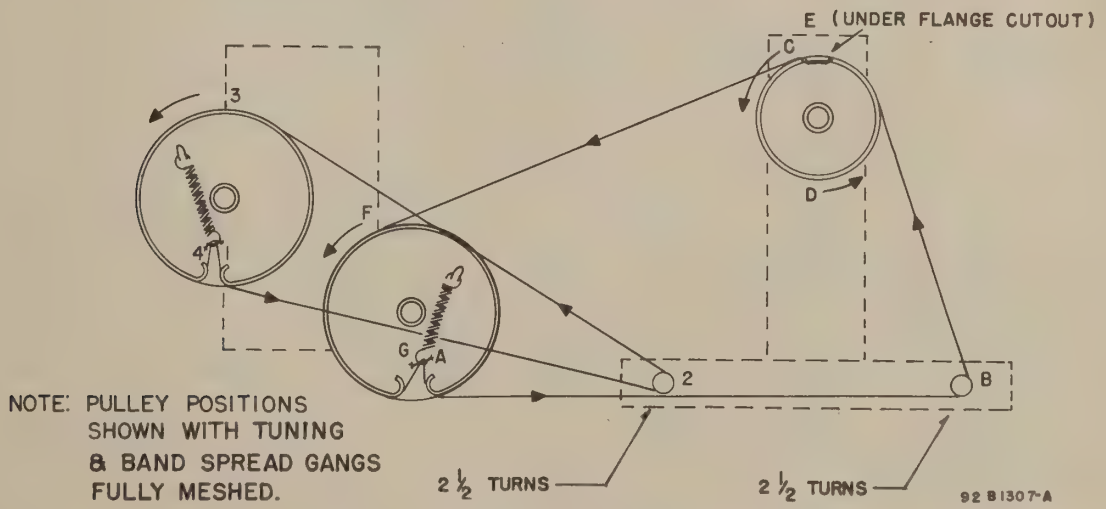


FIG. 4 DIAL CORD STRINGING DIAGRAM

SERVICE OR OPERATING QUESTIONS - For further details regarding operation or servicing of the receiver, contact your dealer. Make no shipments directly to the factory as the factory does not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER. For the location of the SERVICE CENTER nearest you; consult your dealer, telephone directory or look for the sign shown at the right.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

Authorized hallicrafters Service Center
communications equipment

ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED

1. Signal generator, with amplitude modulated output, covering 455 KC to 36 MC. Use a modulated signal generator output for every step except step 2.
2. Output meter. Connect the meter across the speaker voice coil terminals.
3. Standard RMA dummy antenna consisting of a 200 mmf. capacitor in series with a 20 microhenry choke which is shunted by a 400 mmf. capacitor in series with a 400 ohm carbon resistor.
4. Alignment tool made of polystyrene or other similar material.

It is necessary to remove the receiver chassis from the cabinet to make the I-F alignment. The chassis is held in the cabinet by three screws along the bottom edge of both the front panel and rear of the cabinet and by two screws on either side of the front panel.

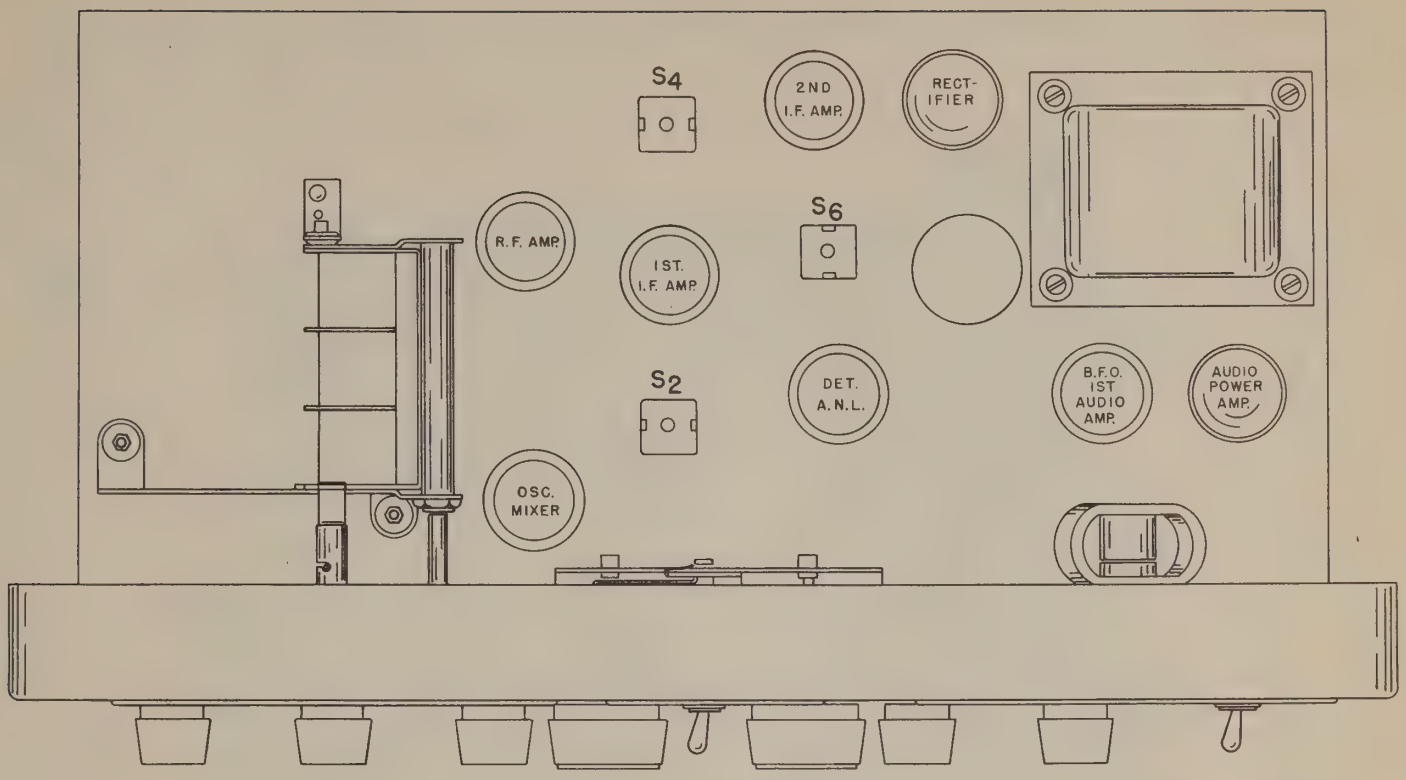
RF alignment should be made with the chassis in the cabinet. Holes in the bottom of the cabinet provide access to all RF adjustments.

Before starting alignment, set the VOLUME, SENSITIVITY and BAND SPREAD controls fully clockwise, AVC and NOISE LIMITER switches at OFF, CW/AM switch at AM and the TONE switch at HIGH. Refer to Figs. 5 and 6 for the location of all adjustments.

ALIGNMENT CHART

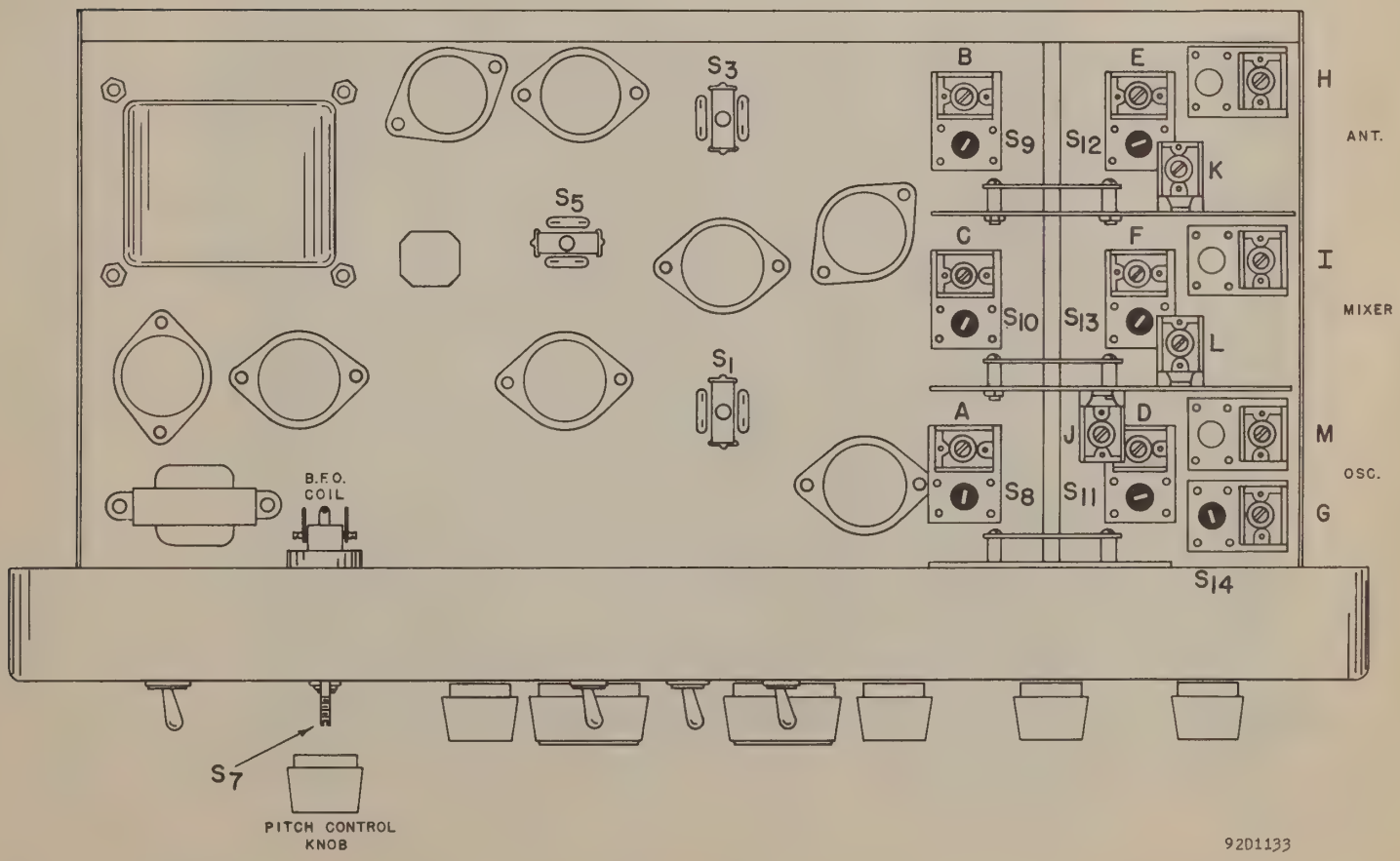
STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GEN. FREQUENCY	BAND SELECTOR SETTING	MAIN TUNING DIAL SETTING	ADJUST	REMARKS
1	Connect the high side of the generator to the stator plates of the center section of the tuning gang. Connect the ground side of the generator to the chassis.	455 KC	1	1000 KC	S1, S2, S3, S4, S5, S6	Adjust for maximum audio output at the speaker voice coil. Use only enough signal generator output to obtain a 50 milliwatt reading on the output meter.
2*	Same as Step 1	455 KC (No Modulation)	1	1000 KC	S7	Set the CW/AM switch at CW. Remove the PITCH CONTROL knob and adjust S7 for a zero beat. Replace the knob with the dot in top center position.
3	Connect the high side of the generator to A1 on the antenna terminal strip through a standard RMA dummy antenna. Place the jumper between A2 and G. Connect the ground side of the generator to the chassis.	36 MC 18 MC	4 4	36 MC 18 MC	A, B, C S8, S9, S10	Maximum output as in Step 1.
4	Same as Step 3	14 MC 10 MC	3 3	14 MC 10 MC	D, E, F S11,S12, S13	Maximum output as in Step 1.
5	Same as Step 3	5 MC 1.8 MC	2 2	5 MC 1.8 MC	G,H,I S14	Maximum output as in Step 1.
6	Same as Step 3	1500 KC 600 KC	1 1	1.5 MC .6 MC	J,K,L M	Maximum output as in Step 1.

* Reset the CW/AM switch at AM when Step 2 is completed.



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FIG. 5 TOP VIEW - LOCATION OF ALIGNMENT ADJUSTMENTS



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FIG. 6 BOTTOM VIEW - LOCATION OF ALIGNMENT ADJUSTMENTS

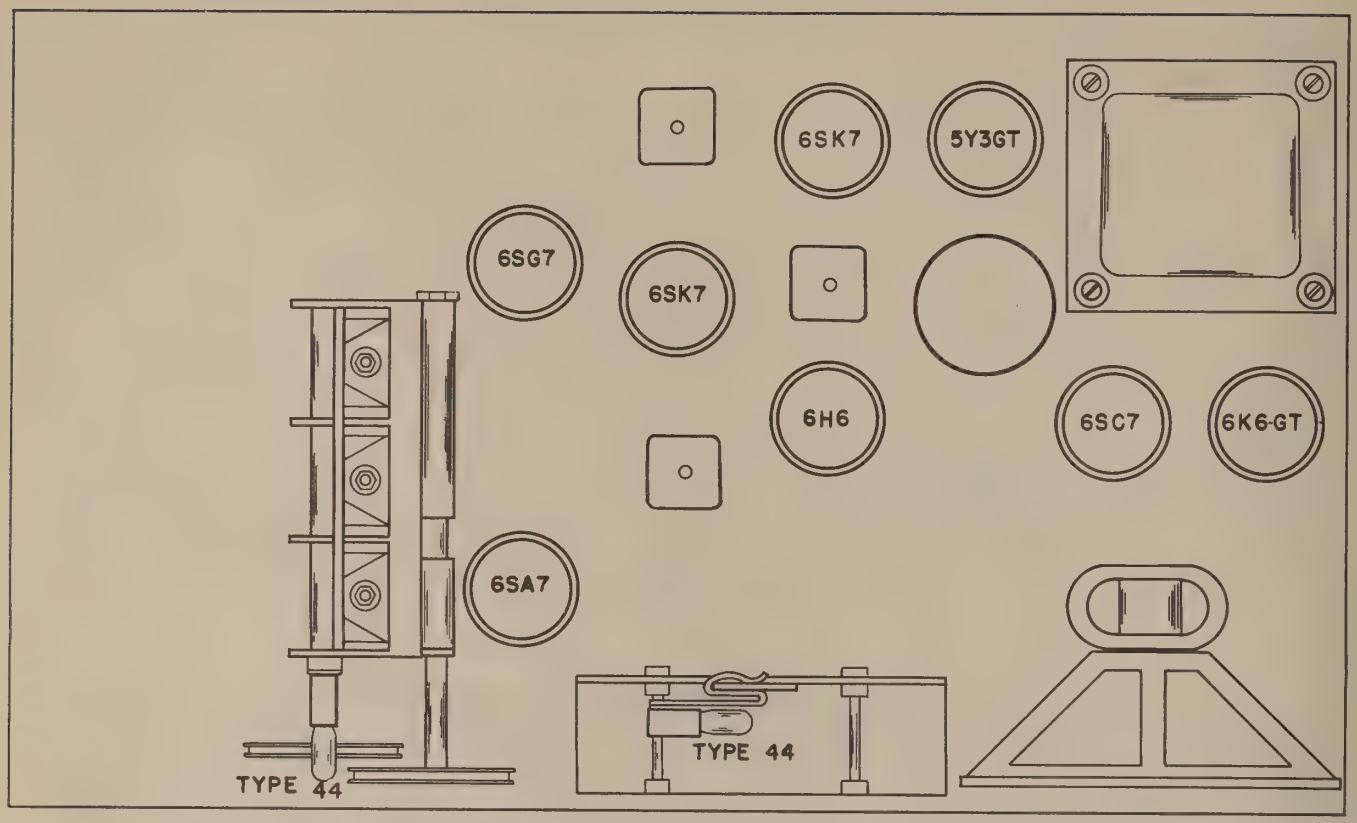
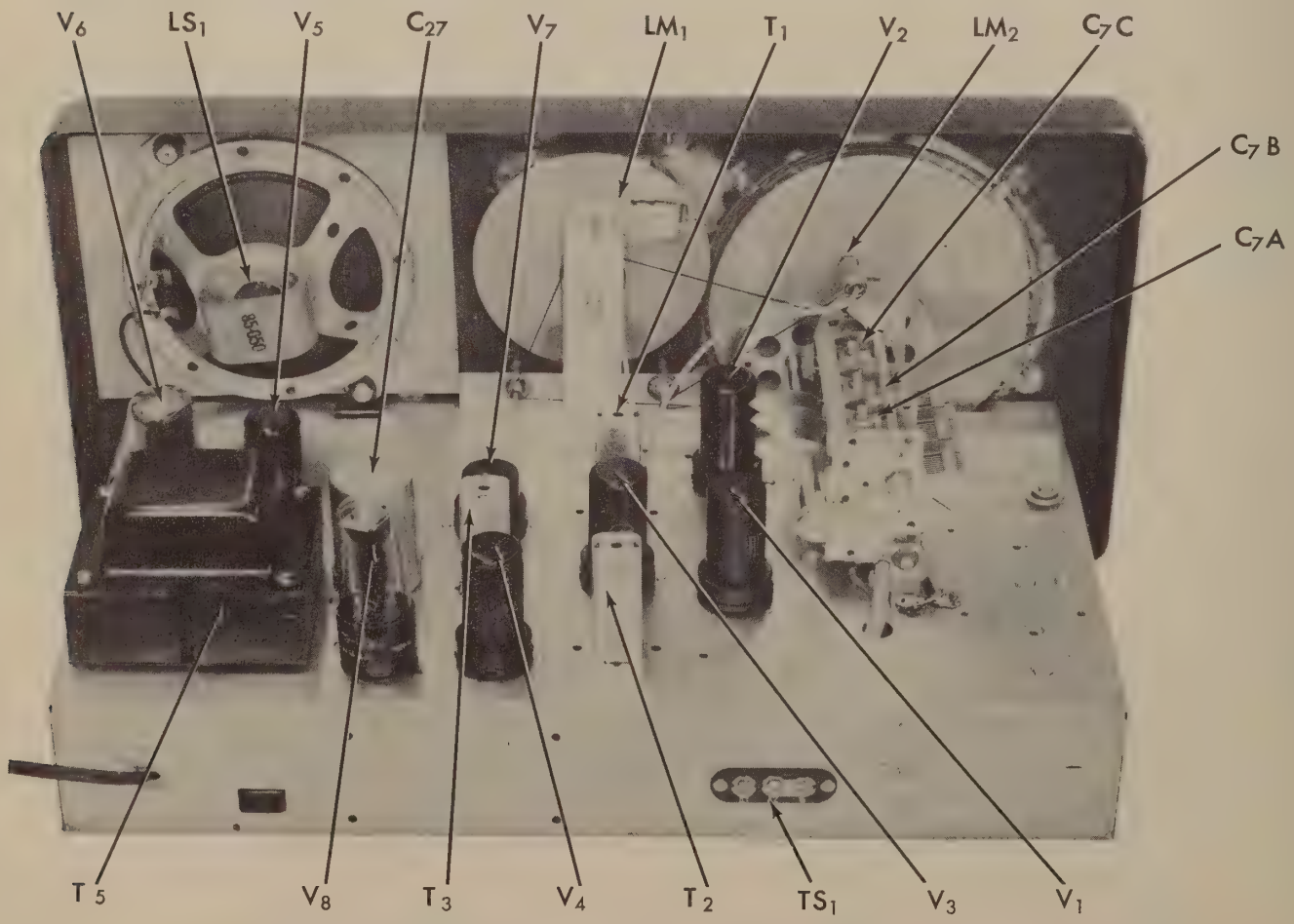
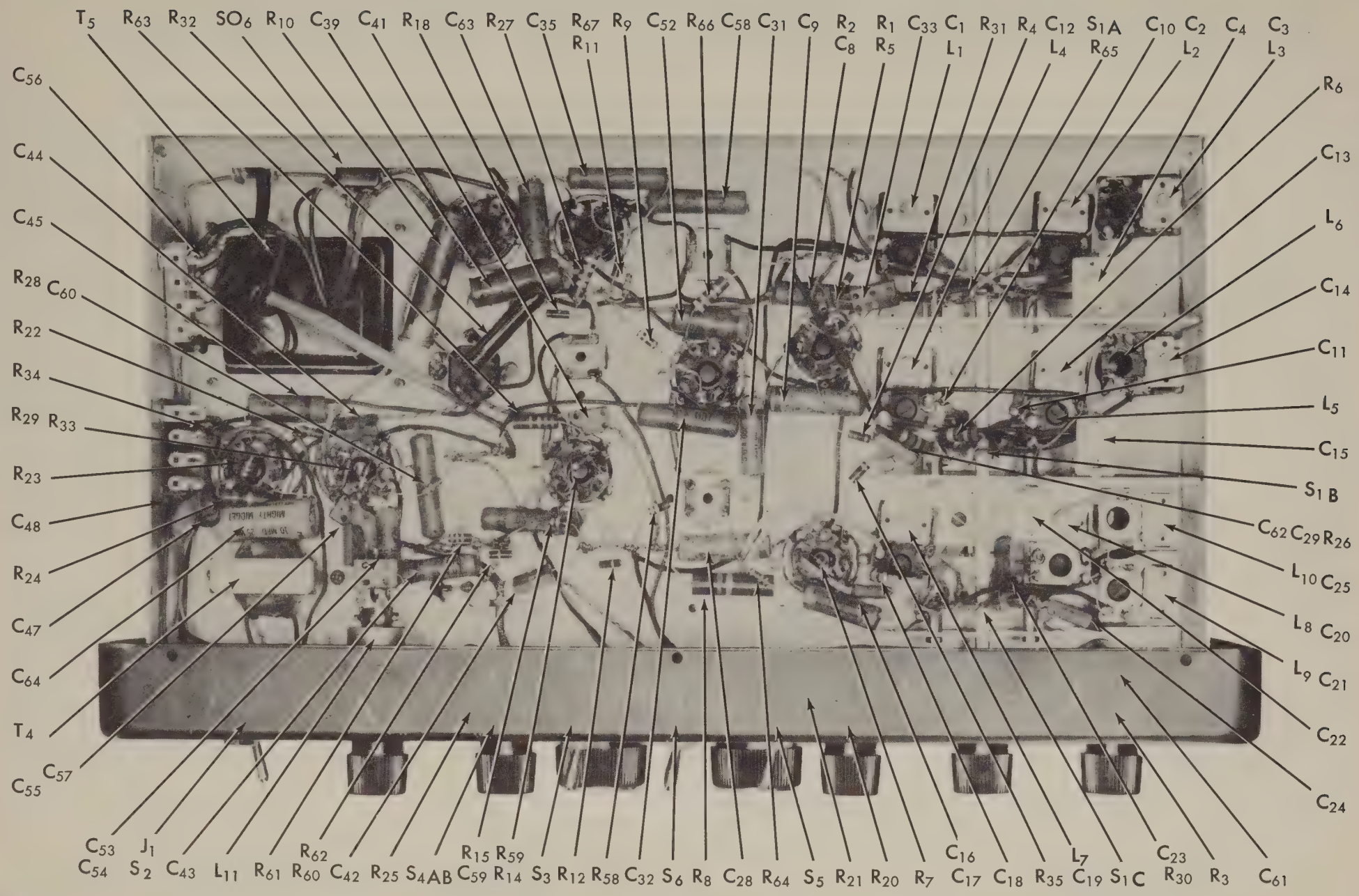


FIG. 7 TOP VIEW - LOCATION OF TUBES AND DIAL LAMPS



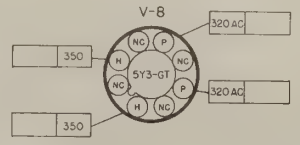
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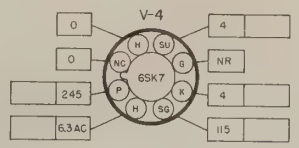
FIG. 8 TOP VIEW - COMPONENT LOCATION

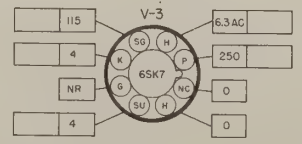


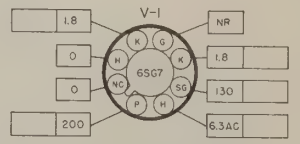
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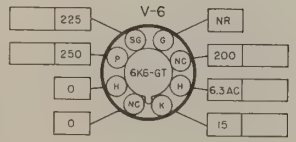
FIG. 9 BOTTOM VIEW - COMPONENT LOCATION

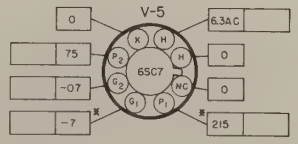




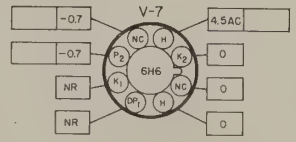


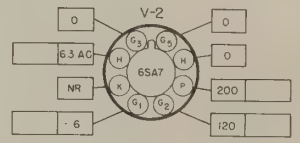






※CW/AM SWITCH IN CW POSITION.





NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE 117 V. AC
4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC"—NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG)
7. "NR"—NOT READABLE (READING GENERALLY MEANINGLESS)
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS

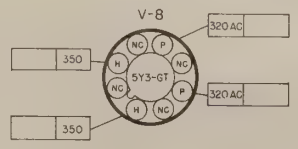
FRONT APRON
BOTTOM VIEW OF CHASSIS

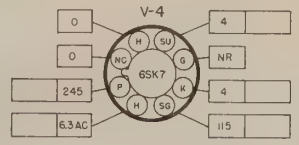
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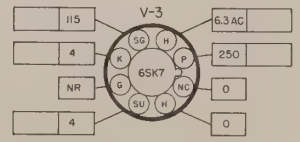
FIG. 10 TUBE SOCKET VOLTAGE CHART

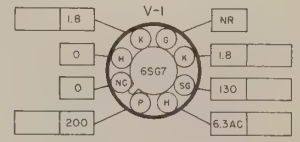
SERVICE PARTS LIST

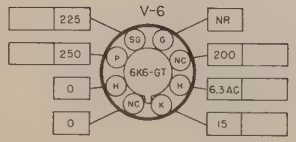
Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3,12, 13,14,19, 20,21	Trimmers; part of coils L-1,2, 3, 4, 5, 6, 7, 8 and 9 respectively	- - - - - -
C-4,15,22	Trimmer, 1.5-15 mmf.	44A191
C-7A,B&C	Tuning capacitor, 3 section	48C240
C-8,32,35, 58,59,60	.05 mfd. 200 V., tubular	46AU503J
C-9,28	.05 mfd. 600 V., tubular	46AY503J
C-10	22 mmf. 500 V., ceramic	47X21UK220M
C-11	15 mmf. 500 V., ceramic	47X21UK150M
C-16	390 mmf. 500 V., mica	47X20B391K
C-17,53	.01 mfd. 600 V., tubular	46AY103J
C-18	68 mmf. 500 V., ceramic	47X25UK680K
C-23	3000 mmf. 500 V., mica	47X30C302K
C-24	1500 mmf. 500 V., mica	47X30C152J
C-25	Padder; part of coil L-10	- - - - -
C-27A,B&C	30-10-10 mfd. 450 V., electrolytic	45A062
C-29,33	220 mmf. 500 V., mica	47X20B221K
C-31,43	.02 mfd. 200 V., tubular	46AU203J
C-38	2 mmf., twisted wire assembly	- - - - -
C-39	.1 mfd. 600 V., tubular	46AY104J
C-41,42	47 mmf. 500 V., mica	47X20B470M
C-44,55	270 mmf. 500 V., mica	47X20B271K
C-45,48,52, 63	.02 mfd. 600 V., tubular	46AY203J
C-47	.002 mfd. 1000 V., tubular	46A104
C-54	470 mmf. 500 V., mica	47X20B471J
C-56	.01 mfd. 600 V., molded tubular	46AC103J
C-57	1000 mmf. 500 V., mica	47X25B102M
C-61	.25 mfd. 200 V., tubular	46AT254J
C-62	2.2 mmf. 500 V., bakelite	47A160-4
C-64	10 mfd. 25 V., electrolytic	45A121
	RESISTORS	
R-1,62	1 megohm 1/2 watt, carbon	23X20X105M
R-2	120 ohms 1/2 watt, carbon	23X20X121K
R-3	10,000 ohms, SENSITIVITY control	25B590
R-4,31	22 ohms 1/2 watt, carbon	23X20X220M
R-5	39,000 ohms 1 watt, carbon	23X30X393K
R-6,26	6800 ohms 1 watt, carbon	23X30X682K
R-7	18,000 ohms 1/2 watt, carbon	23X20X183K
R-8	10,000 ohms 2 watts, carbon	23X40X103K
R-9	470 ohms 1/2 watt, carbon	23X20X471K
R-10	12,000 ohms 4 watts, carbon	23X65CE123K
R-11,18,65	1000 ohms 1/2 watt, carbon	23X20X102K
R-12,59	2.2 megohms 1/2 watt, carbon	23X20X225M
R-14	47,000 ohms 1/2 watt, carbon	23X20X473M
R-15,29,58	100,000 ohms 1/2 watt, carbon	23X20X104M
R-20	500,000 ohms, VOLUME control	25A534
R-21	150 ohms 1/2 watt, carbon	23X20X151M
R-22	270,000 ohms 1/2 watt, carbon	23X20X274K
R-23,61	470,000 ohms 1/2 watt, carbon	23X20X474M
R-24	680 ohms 1 watt, carbon	23X20X681K
R-25	15,000 ohms 1 watt, carbon	23X30X153M
R-27,66	47,000 ohms 1 watt, carbon	23X30X473K
R-28	22,000 ohms 1/2 watt, carbon	23X20X223M
R-30,68	10 ohms 1/4 watt, carbon	23X10X100M
R-32	1500 ohms 10 watts, WW	24BG152E
R-33	15 megohms 1/4 watt, carbon	23X10X156M
R-34	10,000 ohms 1/2 watt, carbon	23X20X103M
R-35	27 ohms 1/4 watt, carbon	23X10X270K
R-60,67	330,000 ohms 1/2 watt, carbon	23X20X334K
R-63	6.8 ohms 1 watt, carbon	23X30X068K
R-64	330 ohms 1/2 watt, carbon	23X20X331K
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; band 4	51B783
L-2	Coil, antenna; band 3	51B782
L-3	Coil, antenna; bands 1 and 2	51B1241
L-4	Coil, RF; band 4	51B787
L-5	Coil, RF; band 3	51B786
L-6	Coil, RF; bands 1 and 2	51B1240
L-7	Coil, oscillator; band 4	51B791
L-8	Coil, oscillator; band 3	51B913
L-9	Coil, oscillator; band 2	51B789
L-10	Coil, oscillator; band 1	51B912
L-11	Coil, BFO	54B044
T-1,2	Transformer, 1st and 2nd IF	50C243
T-3	Transformer, IF; detector stage	50C242
T-4	Transformer, audio output	55B093
T-5	Transformer, power; model S-40B	52A209
T-5	Transformer, power; model S-40BU	52C210
	SWITCHES	
S-1A	Switch wafer, BAND SELECTOR; antenna stage	60B389
S-1B	Switch wafer, BAND SELECTOR; RF stage	62B039
S-1C	Switch wafer, BAND SELECTOR; oscillator stage	62B044
S-2,3,5,6,	Switch, toggle (spst); STANDBY/ RECEIVE, NOISE LIMITER, AVC and CW/AM	60A138
S-4	Switch, PWR-TONE	60A225
	Shaft and index plate, BAND SELECTOR	60B392
	PLUGS AND SOCKETS	
J-1	Jack, PHONES	36A002
PL-1	Line cord and plug	87B1573
	Socket, dial lamp; main tuning dial	86A070
	Socket, dial lamp; band spread dial	86B049
	Socket, octal tube	6A250
	TUBES AND DIAL LAMPS	
V-1	6SG7: RF amplifier	90X6AG7
V-2	6SA7: converter	90X6SA7
V-3,4	6SK7: 1st and 2nd IF amplifiers	90X6SK7
V-5	6SC7: BFO and audio amplifier	90X6SC7
V-6	6K6GT: audio output	90X6K6GT
V-7	6H6: ANL, AVC and detector	90X6H6
V-8	5Y3GT: rectifier	90X5Y3GT
LM-1,2	Lamp, dial; Mazda #44	39A003
	MISCELLANEOUS	
	Cabinet	66D359
	Cabinet top cover	66D616
	Cabinet front panel	68D157
	Dial cord, 40 inch	38A001
	Dial, band spread	83B372
	Dial, main tuning	83C240
	Foot, mounting; rubber	16A007
	Glass, band spread dial	22A307
	Glass, main tuning dial	22B199
	Iron core, RF	77A068
	Knob, BAND SELECTOR	15A266
	Knob, PITCH CONTROL	15A058
	Knob, SENSITIVITY, VOLUME and TONE	15A049
	Knob, TUNING and BAND SPREAD	15A048
	Lock, line cord	76A397
LS-1	Speaker, 5" PM	85B050
	Spring, dial cord	75A012
	Spring, retainer; band spread and main tuning drive shafts	75A062
TS-1	Terminal strip, antenna	88A032

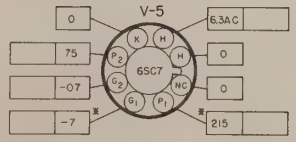




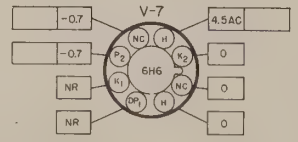


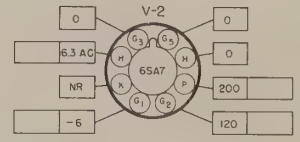






*CW/AM SWITCH IN CW POSITION.





NOTES—
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8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS.

FRONT APRON
BOTTOM VIEW OF CHASSIS

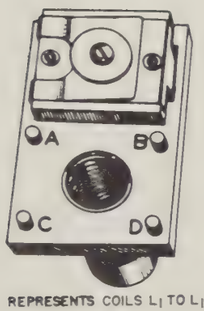
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FIG. 10 TUBE SOCKET VOLTAGE CHART

RF AMP. V_1 6SG7
CONVERTER V_2 6SA7
1ST IF AMP V_3 6SK7
2ND IF AMP V_4 6SK7
AUDIO AMP V_5 1/2 6SC7
AUDIO OUTPUT V_6 6K6-GT
DET, ANL, AVC. V_7 6H6
V_8 5Y3-GT RECTIFIER
BFO. V_5 1/2 6SC7

1- A.C. OFF
2- HIGH
3- MEDIUM
4- LOW

TONE
PHONES
PITCH CONTROL L11
NOISE LIM.
SENSITIVITY
STANDBY/ RECEIVE
AVC
CW/AM
GIMMICK C_{38}
PM
LS1
TS1
PL1
105-125 60 ∼ AC
1.5-15



REPRESENTS COILS L_1 TO L_{10}

SWITCH S_{4B} SHOWN IN IN POSITION 1.
SWITCH IS CLOSED IN POSITIONS 2,3 & 4.

LAST R SYMBOL R-68
LAST C SYMBOL C-64

89D349-C

NOTES

1. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
3. RESISTORS RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH S-1 SHOWN IN BAND 4 POSITION. FOR LOCATION OF SWITCH SECTIONS, SEE FIG. 9.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

FIG. 11 SCHEMATIC DIAGRAM

SHORTWAVE STATION LOG

STATION	CITY	TIME	BAND	TUNING DIAL SETTING	BAND SPREAD DIAL SETTING

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X781
751 RUN 3

POWER SOURCE - The S-40B can be operated from a 105-125 volt, 50-60 cycle AC power outlet. The universal model, the S-40BU, is designed for operation from 115, 130, 150, 220 and 250 volt, 25-60 cycle AC sources. A selector switch, located on the power transformer, permits operation of the S-40BU at the line voltages shown. If in doubt as to the frequency and voltage rating of your power source, contact the local power company representative. Attempting to operate the receiver from sources of power not specified above may result in damage to the receiver.

> CAUTION - When operating the universal model, it is essential that the selector switch setting on the power transformer correspond to the operating line voltage before connecting the receiver to the AC power source.

ANTENNA - A three terminal strip marked A1, A2 and G, is provided on the rear apron of the chassis for antenna connection. Very satisfactory results can be obtained throughout the tuning range of the receiver with a conventional single wire antenna installation (see Fig. 2). In some instances, a short length of wire strung about the room may suffice. However, for improved reception of the higher frequency bands, it is recommended that a doublet antenna installation be employed (see Fig. 3). For further information concerning antennas refer to "ARRL ANTENNA HANDBOOK".

SINGLE WIRE ANTENNA - Connect a single wire antenna 50 to 100 feet long (including lead-in) to terminal A1 on the antenna terminal strip. Connect the jumper between terminals A2 and G. Erect the antenna as high as possible and free of surrounding objects. A ground wire connected between terminal G and a suitable ground such as a cold water pipe or outside ground rod may improve reception.

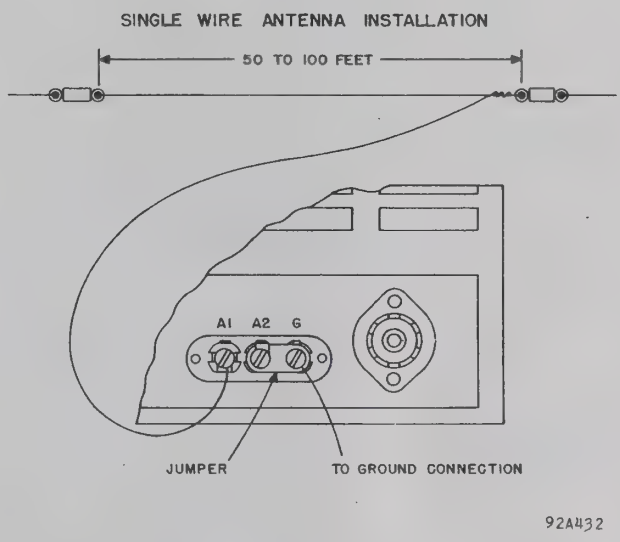


FIG. 2 SINGLE WIRE ANTENNA INSTALLATION

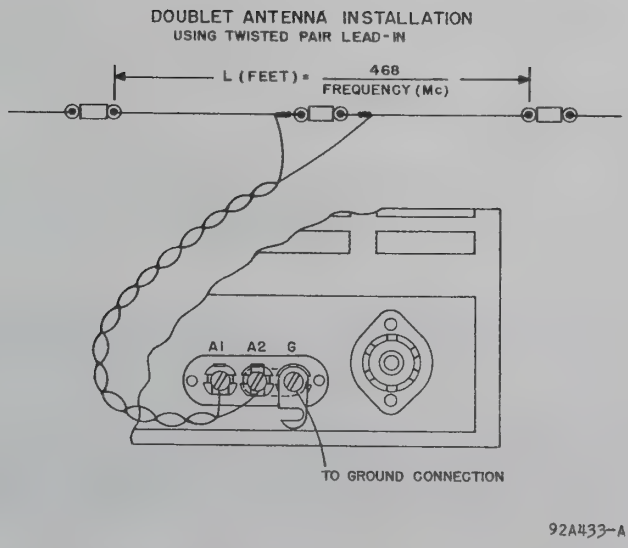


FIG. 3 DOUBLET ANTENNA INSTALLATION

DOUBLET ANTENNA - The overall length, in feet, of the doublet antenna may be determined by dividing 468 by the desired frequency in megacycles. A doublet antenna is somewhat directional broadside to its length and should be so oriented if maximum pickup from a given direction is to be expected.

When feeding the doublet antenna with twisted pair or a ribbon type transmission line, connect the transmission line to terminals A1 and A2 on the antenna terminal strip and disconnect the jumper between terminals A2 and G.

When using a coaxial transmission line, connect the inner conductor to terminal A1, the outer conductor to terminal A2 and place the jumper between terminals A2 and G.

OPERATION

Each control of this receiver performs a definite function that contributes to the outstanding reception capabilities. Full appreciation of the receiver is to be expected only after you have become familiar with each of the controls and the effect their operation has on the performance of the receiver. As an added feature for convenience, the control positions for standard broadcast reception are marked in red. The following use of the controls is recommended to obtain optimum performance from the receiver.

SENSITIVITY control — This control is normally set fully clockwise for maximum sensitivity. In some rare instances, strong local signals may overload the receiver input. Distortion, caused by this condition, can be eliminated by reducing the receiver sensitivity slightly.

BAND SELECTOR switch — This switch is used to select the desired band or frequency range. The frequencies covered by each position of the BAND SELECTOR are read directly from the main tuning dial scale which corresponds to the setting of the BAND SELECTOR switch.

VOLUME control — This control is used to regulate audio volume. Turning the control clockwise increases volume.

AVC switch — This switch, when set to the ON position, places the automatic volume control circuit in operation. The AVC circuit provides a constant audio output level over large variations in signal strength at the antenna. The AVC switch should be set at OFF for CW reception.

TUNING control — This control should be set for the desired station frequency after setting the BAND SELECTOR switch. Frequencies on all bands are shown in megacycles.

IMPORTANT - The main tuning dial calibration is correct only when the BAND SPREAD dial pointer is set at 0.

AM/CW switch — This switch, when set at CW, places the beat frequency oscillator (BFO) in operation making code signals audible. For AM reception, set the switch at AM.

BAND SPREAD control — This control functions to electrically spread out the crowded amateur and shortwave bands. Band spread tuning is not necessary on the broadcast band.

Band spread tuning is accomplished as follows: (1) Set the band spread dial pointer at 0 (2) Position the TUNING control for the high frequency end of the amateur band or range of frequencies to be covered and (3) Tune through the amateur band or frequency range with the BAND SPREAD control.

NOTE: It is possible to log shortwave stations by recording the settings of the main tuning and band spread logging scales.

NOISE LIMITER switch — This switch is normally set at OFF. Set the NOISE LIMITER switch at ON when severe electrical disturbances interfere with reception.

TONE control — This control attenuates the high audio frequencies to the extent required by various receiving conditions. In addition, it is used to turn the receiver on and off. In the AC OFF position, the power to the receiver is disconnected. For CW reception, set the TONE control at LOW.

PITCH CONTROL — This control is used to vary the pitch of the CW code signal when listening to amateur or commercial code stations and should be set for the tone most pleasing to the operator.

STANDBY/RECEIVE switch — This switch, normally set at RECEIVE, is particularly useful to the "ham" as it provides a means of placing the receiver in an inoperative condition for standby periods, at the same time maintaining the tube heaters at operating temperature. The receiver is inoperative when the switch is set at STANDBY.

HEADPHONE OPERATION - The PHONES jack, located on the front panel, permits the use of standard headphones with the receiver. The speaker is automatically disconnected when the headphone plug is inserted in the PHONES jack.

SERVICE

GENERAL SPECIFICATIONS

Tubes . . . . . Eight including one rectifier
Speaker . . . . . 5" PM
Voice Coil Impedance. . . . . 3.2 ohms
Antenna Input . . . . . For a 50-600 ohm line or single wire lead-in
Intermediate Frequency . . . . . 455 KC
Power Supply . . Model S-40B: 105-125 V. 50-60 cycle AC
. . Model S-40BU: 105-250 V. 25-60 cycle AC
Power Consumption . . . . . 75 watts

FREQUENCY COVERAGE

Band	Frequency Range	Reception
1	540 KC - 1680 KC	AM/CW
2	1680 KC - 5.4 MC	AM/CW
3	5.3 MC - 15.5 MC	AM/CW
4	15.5 MC - 44 MC	AM/CW

DIAL LAMP REPLACEMENT - Refer to Fig. 7 for the location of the dial lamps used in the receiver. To gain access to defective lamps, raise the hinged top cover of the cabinet. To make a dial lamp replacement, unclip the dial lamp socket from the mounting bracket. Replace defective lamps with 6-8 volt, 250 ma (blue bead) Mazda #44 pilot lamps.

RESTRINGING DIAL CORD - The dial drive system of the receiver consists of two separate string drives (1) main tuning dial drive and (2) band spread tuning dial drive. All restringing should be done with the main tuning and band spread gangs fully meshed.

MAIN TUNING DIAL DRIVE - Tie one end of an 16 inch length of 30 lb. test dial cord to the tension spring at position 1 on the main tuning capacitor drive pulley. Stretch the tension spring and follow the stringing procedure 1 through 4. At position 4, tie the cord securely to the spring.

BAND SPREAD DIAL DRIVE - Tie one end of a 24 inch length of 30 lb. test dial cord to the tension spring at position A on the band spread capacitor drive pulley. Stretch the tension spring and follow the stringing procedure A through G. At position G, tie the cord securely to the spring.

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 7. Raise the hinged top cover of the cabinet to gain access to all tubes. When installing a replacement tube, insert the center guide pin of the tube into the center hole of the tube socket, rotate the tube until the key on the guide pin drops into the notch in the socket hole and then push down until the base of the tube rests firmly on the socket. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

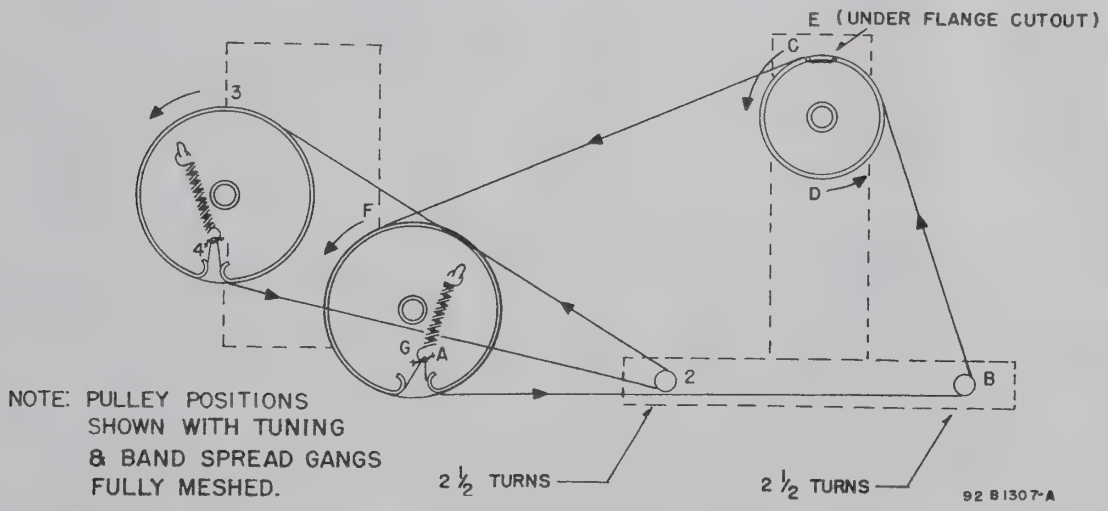


FIG. 4 DIAL CORD STRINGING DIAGRAM

SERVICE OR OPERATING QUESTIONS - For further details regarding operation or servicing of the receiver, contact your dealer. Make no shipments directly to the factory as the factory does not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER. For the location of the SERVICE CENTER nearest you; consult your dealer, telephone directory or look for the sign shown at the right.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED

1. Signal generator, with amplitude modulated output, covering 455 KC to 36 MC. Use a modulated signal generator output for every step except step 2.
2. Output meter. Connect the meter across the speaker voice coil terminals.
3. Standard RMA dummy antenna consisting of a 200 mmf. capacitor in series with a 20 microhenry choke which is shunted by a 400 mmf. capacitor in series with a 400 ohm carbon resistor.
4. Alignment tool made of polystyrene or other similar material.

It is necessary to remove the receiver chassis from the cabinet to make the I-F alignment. The chassis is held in the cabinet by three screws along the bottom edge of both the front panel and rear of the cabinet and by two screws on either side of the front panel.

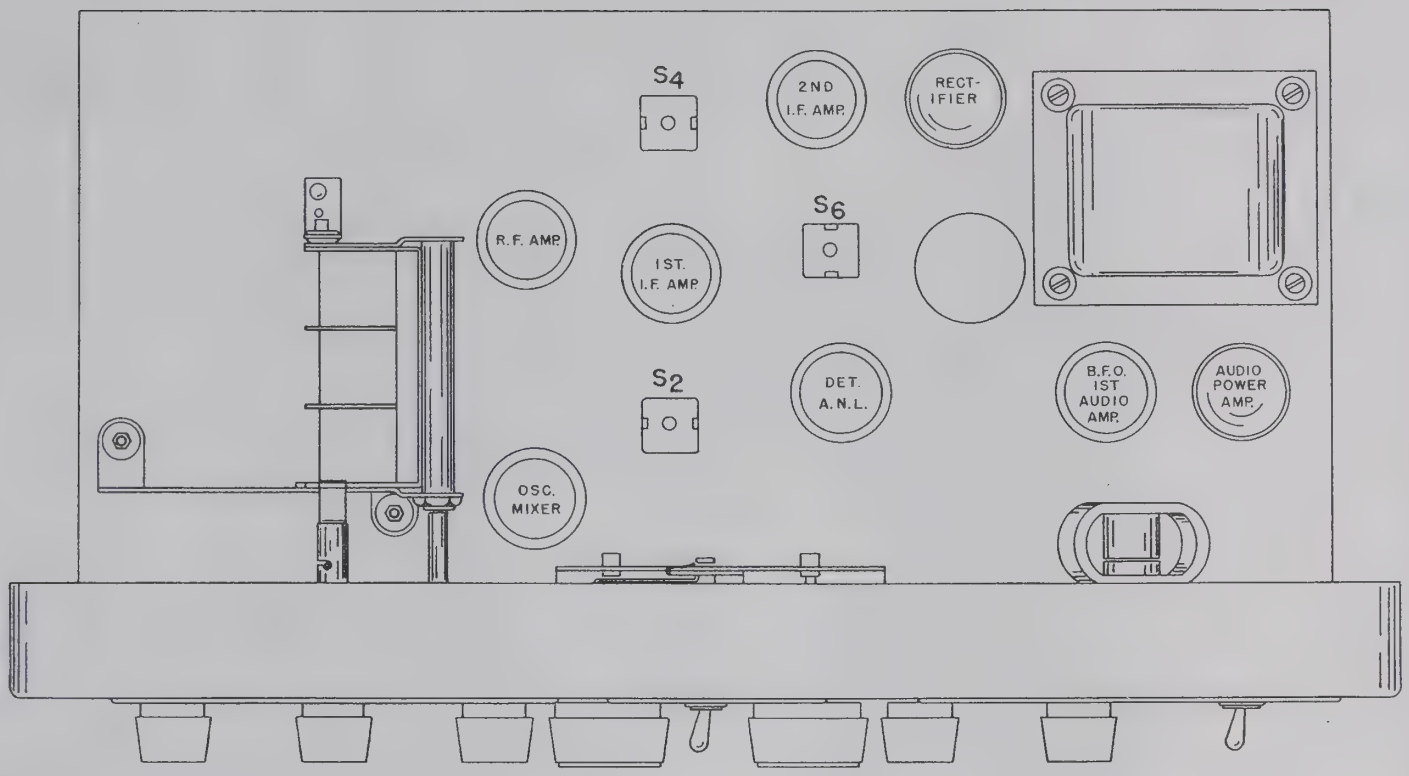
RF alignment should be made with the chassis in the cabinet. Holes in the bottom of the cabinet provide access to all RF adjustments.

Before starting alignment, set the VOLUME, SENSITIVITY and BAND SPREAD controls fully clockwise, AVC and NOISE LIMITER switches at OFF, CW/AM switch at AM and the TONE switch at HIGH. Refer to Figs. 5 and 6 for the location of all adjustments.

ALIGNMENT CHART

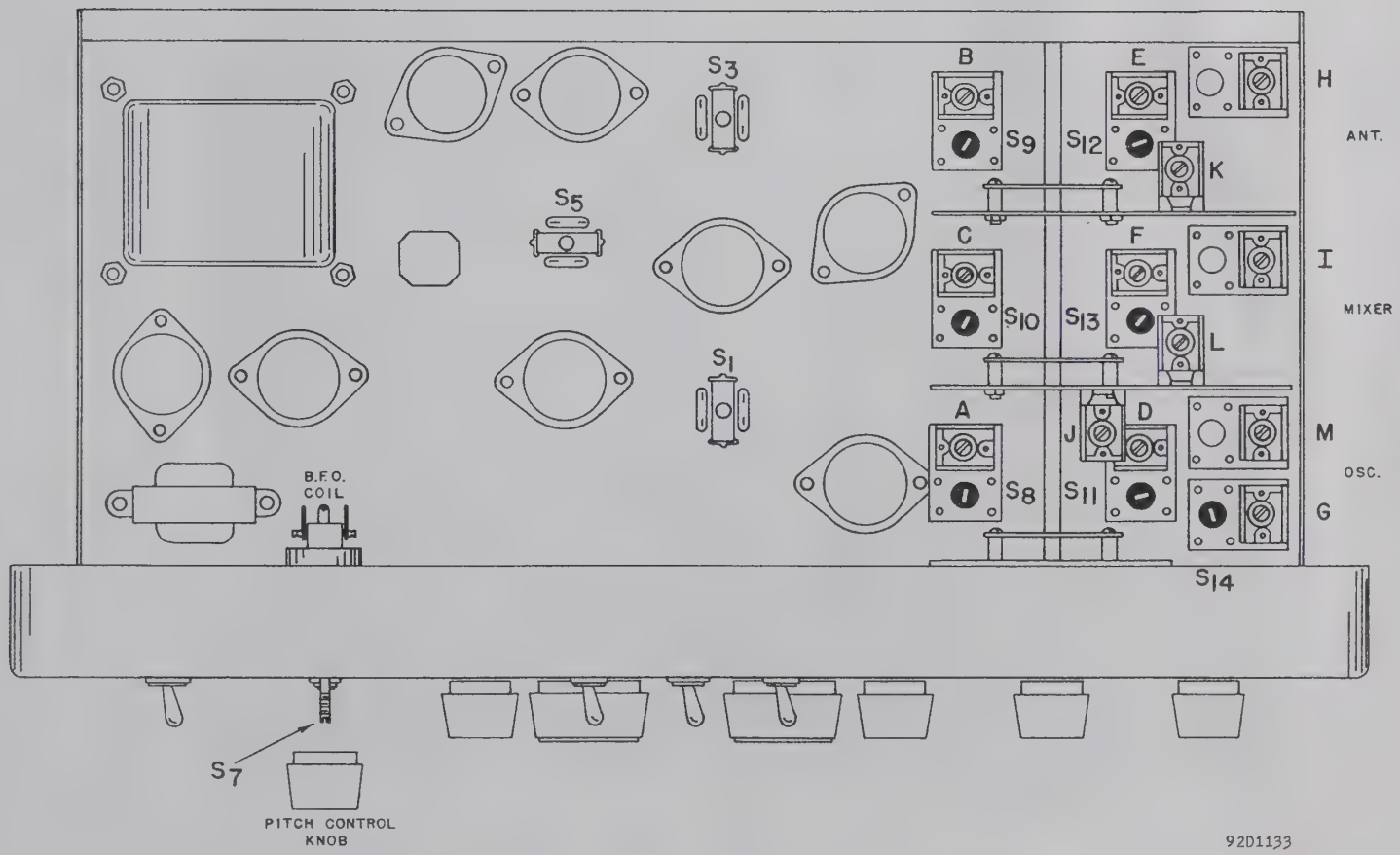
STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GEN. FREQUENCY	BAND SELECTOR SETTING	MAIN TUNING DIAL SETTING	ADJUST	REMARKS
1	Connect the high side of the generator to the stator plates of the center section of the tuning gang. Connect the ground side of the generator to the chassis.	455 KC	1	1000 KC	S1, S2, S3, S4, S5, S6	Adjust for maximum audio output at the speaker voice coil. Use only enough signal generator output to obtain a 50 milliwatt reading on the output meter.
2*	Same as Step 1	455 KC (No Modulation)	1	1000 KC	S7	Set the CW/AM switch at CW. Remove the PITCH CONTROL knob and adjust S7 for a zero beat. Replace the knob with the dot in top center position.
3	Connect the high side of the generator to A1 on the antenna terminal strip through a standard RMA dummy antenna. Place the jumper between A2 and G. Connect the ground side of the generator to the chassis.	36 MC 18 MC	4 4	36 MC 18 MC	A, B, C S8, S9, S10	Maximum output as in Step 1.
4	Same as Step 3	14 MC 10 MC	3 3	14 MC 10 MC	D, E, F S11,S12, S13	Maximum output as in Step 1.
5	Same as Step 3	5 MC 1.8 MC	2 2	5 MC 1.8 MC	G,H,I S14	Maximum output as in Step 1.
6	Same as Step 3	1500 KC 600 KC	1 1	1.5 MC .6 MC	J,K,L M	Maximum output as in Step 1.

* Reset the CW/AM switch at AM when Step 2 is completed.



92D1132

FIG. 5 TOP VIEW - LOCATION OF ALIGNMENT ADJUSTMENTS



92D1133

FIG. 6 BOTTOM VIEW - LOCATION OF ALIGNMENT ADJUSTMENTS

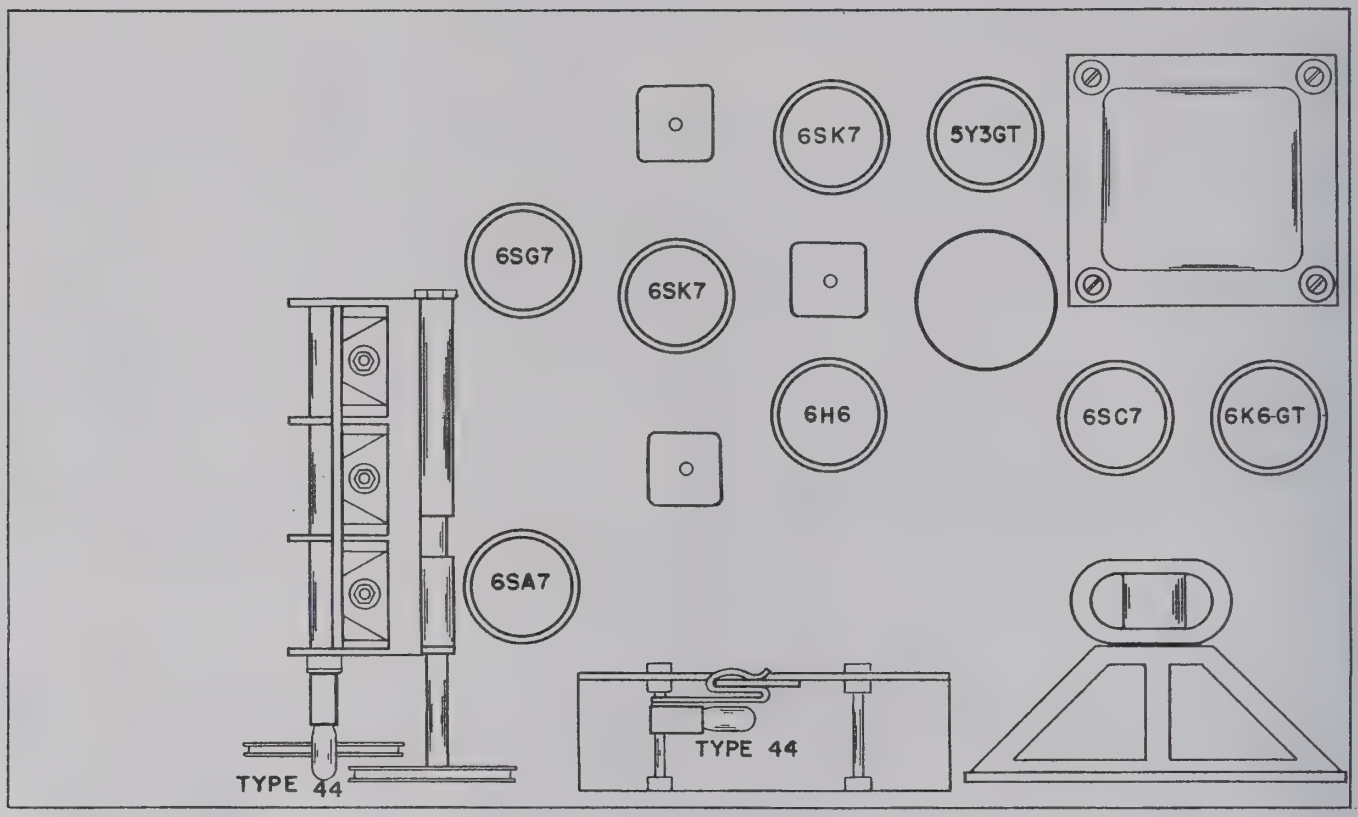


FIG. 7 TOP VIEW - LOCATION OF TUBES AND DIAL LAMPS

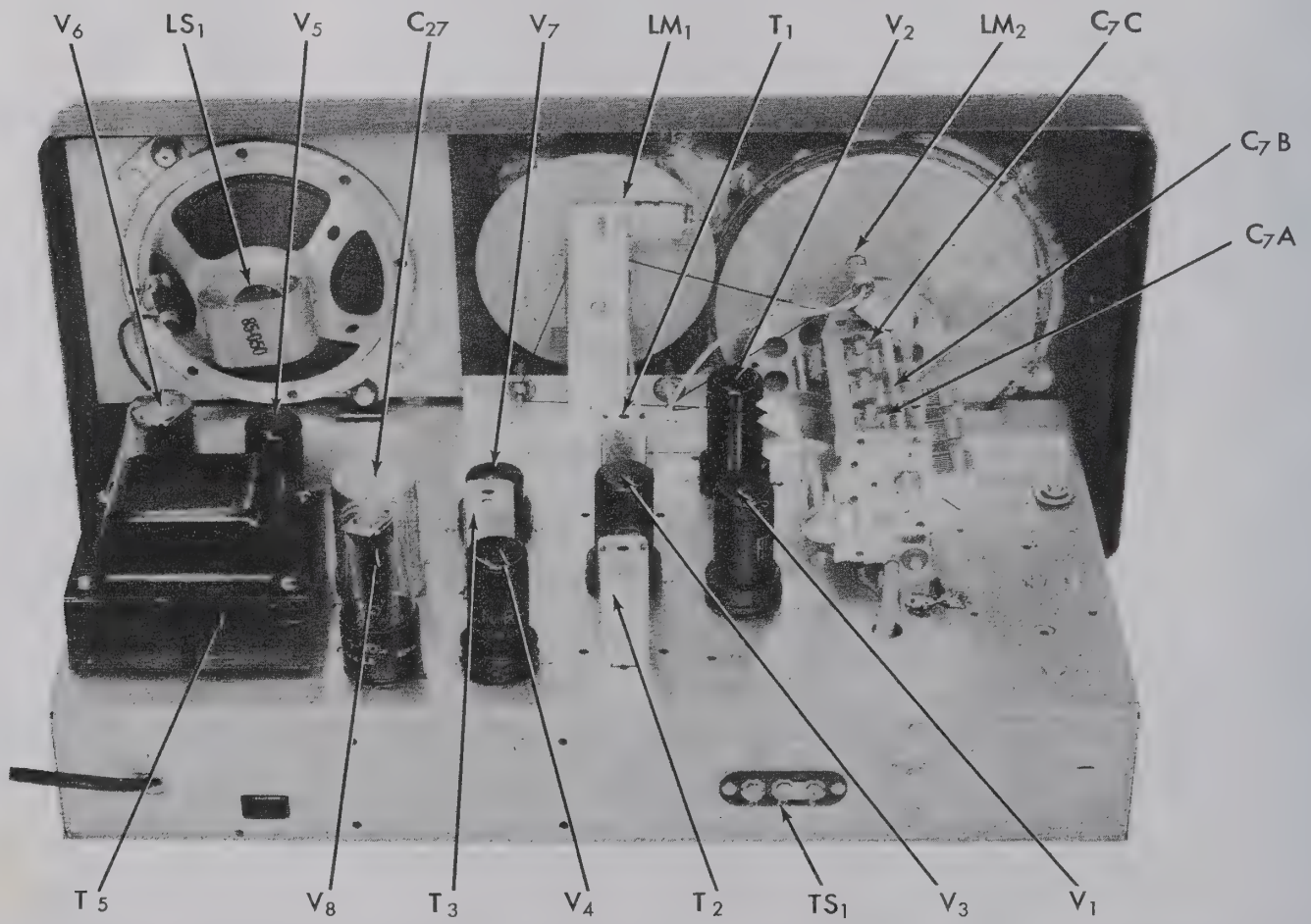


FIG. 8 TOP VIEW - COMPONENT LOCATION

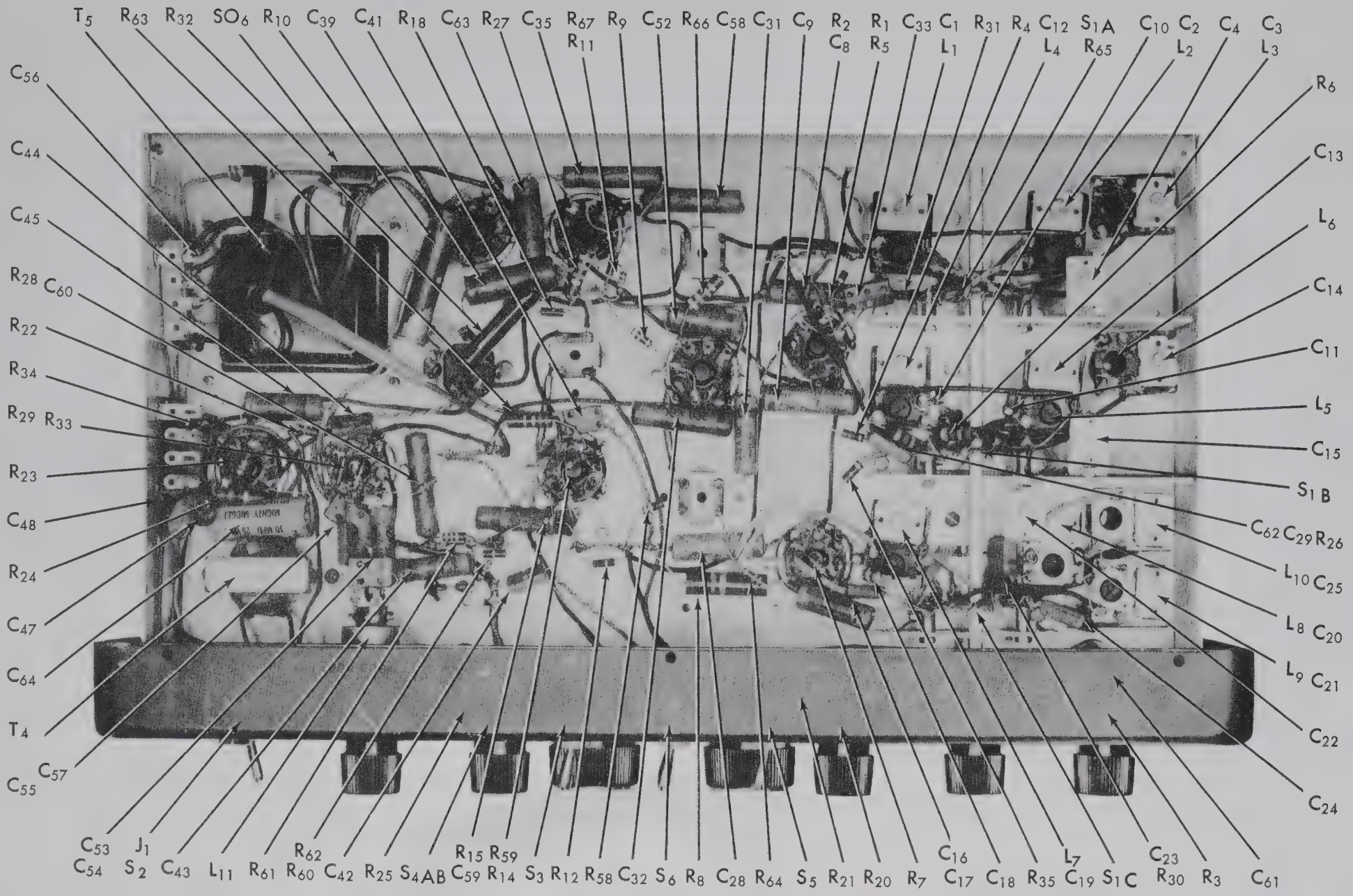
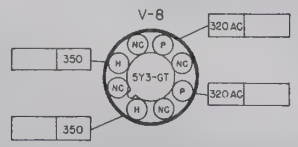
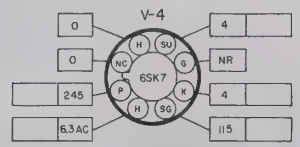
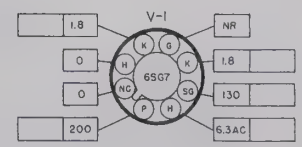


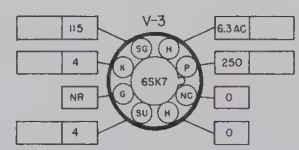
FIG. 9 BOTTOM VIEW - COMPONENT LOCATION

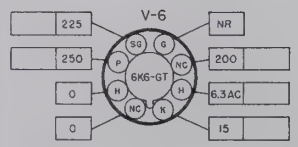
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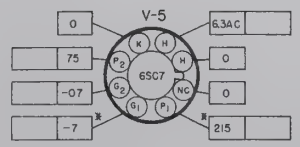




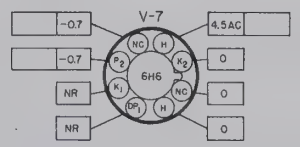


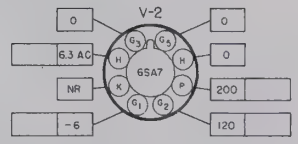






*CW/AM SWITCH IN CW POSITION.





NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE 117 V. AC
4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC"—NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG)
7. "NR"—NOT READABLE (READING GENERALLY MEANINGLESS)
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS.

FRONT APRON
BOTTOM VIEW OF CHASSIS

92E1097-A

FIG. 10 TUBE SOCKET VOLTAGE CHART

SHORTWAVE STATION LOG

STATION	CITY	TIME	BAND	TUNING DIAL SETTING	BAND SPREAD DIAL SETTING

communications

OPERATING and SERVICE INSTRUCTIONS

S-72

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

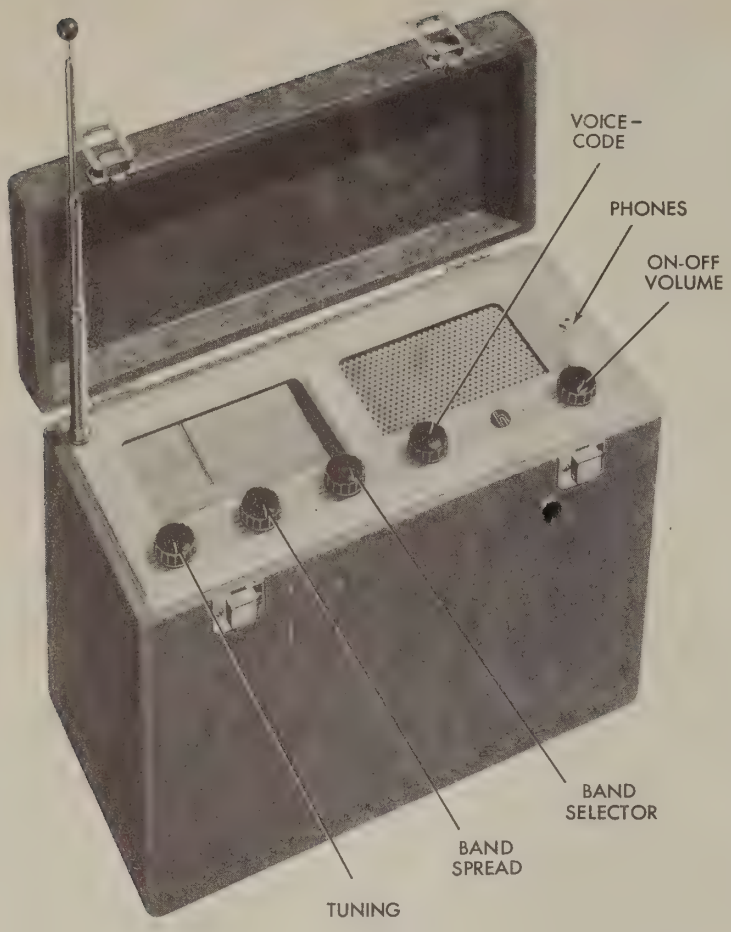


FIG. 1 MODEL S-72

DESCRIPTION

Model S-72 is a portable all-wave superheterodyne radio receiver which covers the standard broadcast and foreign and domestic shortwave bands. The receiver provides AM and CW reception over its entire frequency range, with continuous coverage from 540 kilocycles (KC) to 30 megacycles (MC). Eight tubes and a selenium rectifier are used in the receiver.

FREQUENCY COVERAGE

BAND	FREQUENCY RANGE
1	540 KC - 1600 KC
2	1.5 MC - 4.4 MC
3	4.3 MC - 11.5 MC
4	11 MC - 30 MC

Built-in antenna facilities are provided for normal receiving conditions: a loop antenna for standard broadcast reception (band 1) and a telescoping whip antenna for shortwave reception (bands 2, 3 and 4). A terminal has also been provided for connection to an external single wire antenna for reception in areas of extremely low signal strength where it is difficult to obtain a desired signal using the loop or whip antennas.

The BAND SPREAD control is a fine tuning adjustment provided for electrically spreading out any narrow range of frequencies in the tuning range of the receiver.

The receiver is equipped with a built-in 5 inch PM speaker. The PHONES jack located on the control panel is provided for connection to a pair of headphones.

The VOICE/CODE control permits selection of either AM (VOICE) or CW (CODE) reception. In the CODE position, the control also functions as a RF gain or sensitivity adjustment.

The receiver is designed both for fixed operation from a 105-125 volt DC or 50-60 cycle AC power source and portable operation from a self-contained 90 volt - $7\frac{1}{2}$ volt battery pack. Before attempting to operate the receiver, carefully read the INSTALLATION and OPERATION sections of this book.

INSTALLATION

UNPACKING - Check all shipping labels and tags for instructions before removing or destroying them.

LOCATION - The receiver is equipped with carrying facilities for portable operation as well as mounting feet for table top or shelf mounting when operating from commercial power sources. Reception of the standard broadcast band does not require the use of the whip antenna; however, for shortwave reception, clearance for the 61 inch whip antenna must be provided as the antenna must be fully extended for maximum performance.

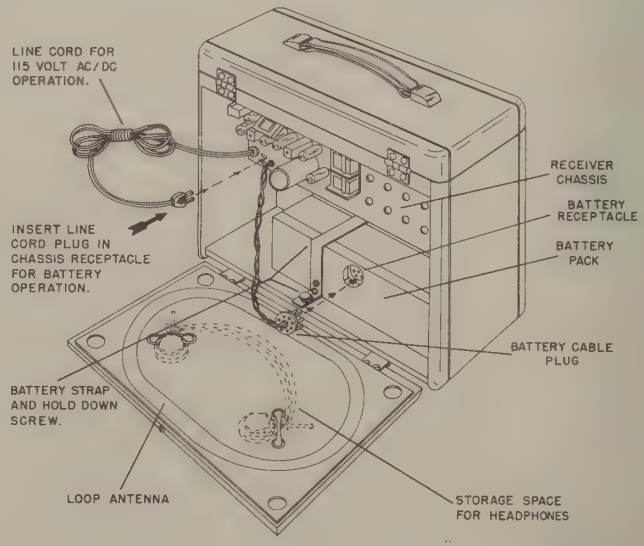


FIG. 2 REAR VIEW, REAR DOOR OPEN

OPERATION

BATTERY OPERATION

1. Select one of the 90 volt - $7\frac{1}{2}$ volt battery packs listed on page 4. Refer to Fig. 2 for an illustration of the battery installation.
2. Open the rear door of the cabinet by pulling out on the finger grip provided.
3. Place the battery pack into the compartment located below the receiver chassis and fasten the BATTERY STRAP securely around the battery.
4. Insert the BATTERY CABLE PLUG into the BATTERY RECEPTACLE.
5. Insert the LINE CORD PLUG into the CHASSIS RECEPTACLE.

CAUTION - Do not store the receiver with the battery in the battery compartment. Damage to the receiver due to possible leakage from a dead battery can be avoided by removing the battery and storing it separately in a cool, dry place.

AC/DC OPERATION

1. The receiver is designed to operate from a 105-125 volt, DC or 50-60 cycle AC power source. The power consumption is 25 watts. If in doubt as to the frequency or voltage rating of your power source, contact the local power company representative.
2. Insert the line cord plug into any convenient power outlet.
3. When operating on DC, reverse the line cord plug if the receiver does not operate after having been turned ON.
4. Operation from a 220 volt, 50-60 cycle AC source is possible by using a special step down transformer available as an accessory. Consult your Hallicrafters dealer regarding this transformer (Hallicrafters part number 52B088).

STANDARD BROADCAST RECEPTION

1. Set the BAND SELECTOR switch at 1 for the standard broadcast band.
2. Turn the VOICE/CODE control clockwise past the point of switch action to the VOICE position.
3. Set the BAND SPREAD dial pointer at 0.
4. Turn the receiver ON by rotating the ON-OFF VOLUME control clockwise. This control will have to be reset for the desired volume level after the station has been tuned in.
5. Tune in the desired station with the TUNING control. Read the frequency from the dial scale marked BAND 1.
6. The built-in loop antenna is used for standard broadcast reception. This type of antenna is directional. If satisfactory reception of a station is not obtained, rotate the entire receiver for the position which will provide the greatest signal.
7. To turn the receiver OFF, turn the ON-OFF VOLUME control counterclockwise until the switch click is heard.

SHORTWAVE RECEPTION

1. Extend the whip antenna to its full length. A short length of wire located in the battery compartment has been provided for connection to a separate external single wire antenna. It is only necessary to use an external antenna in low signal strength areas where it is difficult to receive a desired signal using the whip antenna.
2. Set the BAND SELECTOR switch at 2, 3 or 4 for the desired shortwave band. When tuning, read the dial scale which corresponds to the setting of the BAND SELECTOR.
3. Set the BAND SPREAD dial pointer at 0.
4. FOR VOICE RECEPTION - Turn the VOICE/CODE control clockwise past the point of switch action to the VOICE position.

   FOR CODE RECEPTION - Set the VOICE/CODE control to CODE. The VOICE/CODE control performs two functions when set at CODE: (1) It places the beat frequency oscillator in operation to make code signals intelligible and (2) It controls the sensitivity of the receiver. When strong code signals block the receiver, reduce the sensitivity slightly by turning the control counterclockwise.
5. Turn the receiver ON by rotating the ON-OFF VOLUME control clockwise. Turn this control to a well advanced position and reset it for the desired volume after the station has been tuned in.
6. Tune in the desired station with the TUNING control. For CODE RECEPTION, adjust the TUNING control for the desired pitch of the code signal.
7. For fine tuning of the shortwave bands, refer to BAND SPREAD TUNING on page 4.

BAND SPREAD TUNING

1. The BAND SPREAD control is a fine tuning adjustment which electrically spreads out any narrow range of frequencies in the tuning range of the receiver. Band spread tuning is not necessary on the standard broadcast band.
2. Set the BAND SPREAD dial pointer at 0.
3. Set the TUNING DIAL pointer at the high frequency end of the range of frequencies to be covered.
4. Tune through the frequency range with the BAND SPREAD control.
5. Logging of shortwave stations is possible by recording the settings of the TUNING and BAND SPREAD dial scales.

IMPORTANT - The calibration of the TUNING dial scales will be correct ONLY when the BAND SPREAD dial pointer is set at 0.

HEADPHONES

1. Any standard pair of headphones with an impedance of 500 to 2000 ohms can be used with the receiver.
2. To connect the headphones, insert the headphone plug into the PHONES jack located on the control panel. Attaching the headphones automatically disconnects the speaker.
3. Storage space for the headphones is provided on the rear door of the cabinet. See Fig. 2.

SERVICE INSTRUCTIONS

GENERAL SPECIFICATIONS

Tubes and Rectifiers . . . . . 8 tubes and 1 selenium rectifier
Speaker . . . . . 5 inch PM
Voice Coil Impedance . . . . . 3.2 ohms
Headphone Output Impedance . . . . . 100 ohms
Antenna . . . . . Loop for band 1, whip for bands 2, 3 and 4 and terminal for connection to an external antenna.
Intermediate Frequency . . . . . 455 KC
Power Supply . . . . . 105-125 volts DC/50-60 cycle AC or 90 - 7½ volt battery pack.
Power Consumption . . . . 25 watts on AC/DC
Frequency Coverage . . . . . See page 2

BATTERY REPLACEMENT - Select one of the battery types listed below under REPLACEMENT BATTERIES. For installation instructions, refer to BATTERY OPERATION on page 3.

REPLACEMENT BATTERIES

Manufacturer	Type	Manufacturer	Type
BRIGHT STAR	66-50	OLIN	0615
BURGESS	G6M60		0614
	F6A60	RAY-O-VAC	AB878
DELCO	8760		AB994
EVEREADY	754	RCA	VS018
	753		VS019
GENERAL	60BF65	SEARS	67E605
	60A6F65	USALITE	680
MONT. WARD	62A35M	WEST. WIZARD	
	62A33		60B6F6/5
NAT. UNION	N808		60A6F6/5

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 4. When installing a replacement tube, line up the seven small pins with the socket holes and then push straight down on the tube until the base of the tube rests on the socket. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

RESTRINGING DIAL CORD - The dial drive system of the S-72 consists of three separate string drives (1) BAND SPREAD gang and pointer drive (2) TUNING gang drive and (3) TUNING pointer drive. Refer to Fig. 3 for the dial stringing diagrams.

BAND SPREAD GANG AND POINTER DRIVE

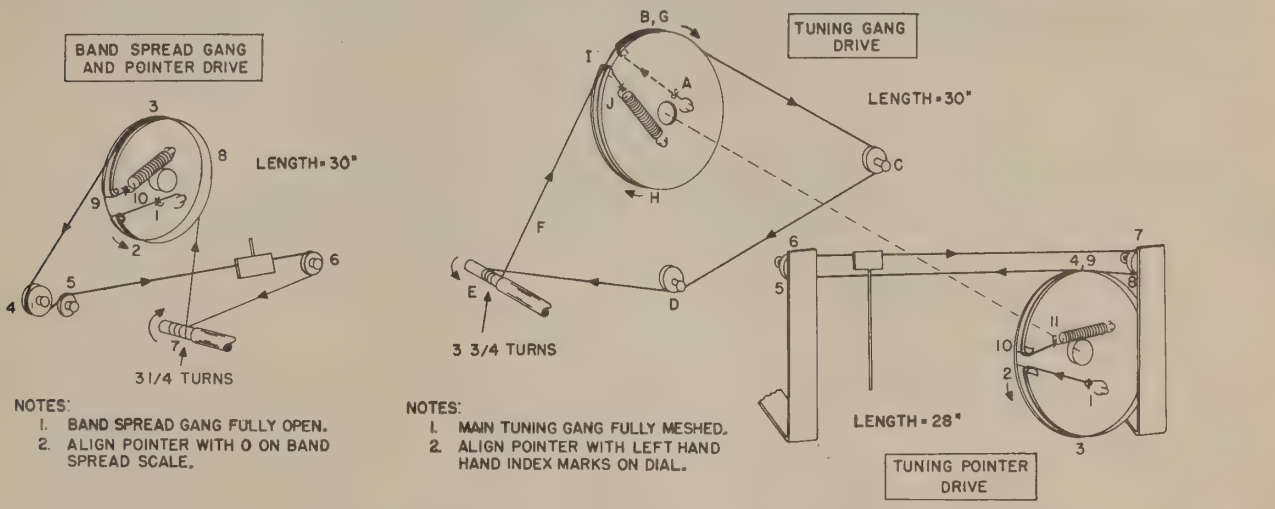
1. Set the BAND SPREAD gang in a fully open position (minimum capacity).
2. Tie one end of a 30 inch length of 30 lb. test dial cord to the hook at position 1 on the BAND SPREAD gang drive pulley.
3. Follow the stringing procedure 1 through 10. At position 10, stretch the tension spring and tie the cord securely to the spring.
4. With the BAND SPREAD gang fully opened, attach the dial pointer to the cord and align it with 0 on the BAND SPREAD SCALE.

TUNING GANG DRIVE

1. Set the TUNING gang in a fully meshed position (maximum capacity).
2. Tie one end of a 30 inch length of 30 lb. test dial cord to the hook at position A on the rear TUNING gang drive pulley.
3. Follow the stringing procedure A through J. At position J, stretch the tension spring and tie the cord securely to the spring.

TUNING POINTER DRIVE

1. Set the TUNING gang in a fully meshed position.
2. Tie one end of a 28 inch length of 9 lb. test dial cord to the hook at position 1 on the front TUNING gang drive pulley.
3. Follow the stringing procedure 1 through 11. At position 11, stretch the tension spring and tie the cord securely to the spring.
4. With the TUNING gang fully meshed, attach the dial pointer to the cord and align it with the left hand index marks on the dial.



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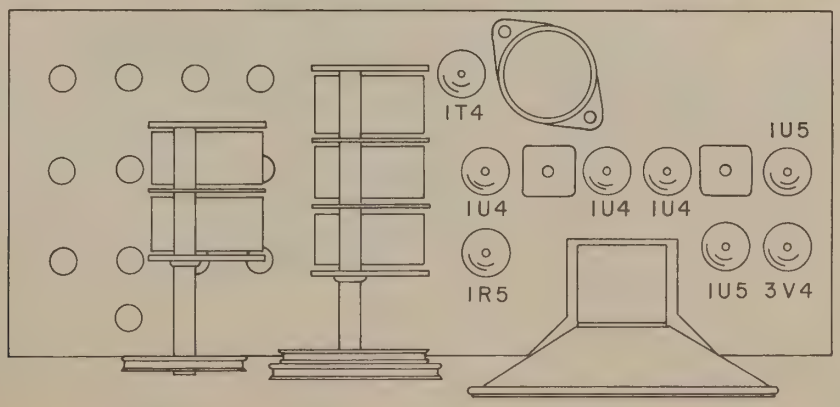
FIG. 3 DIAL CORD STRINGING DIAGRAMS

SERVICE OR OPERATING QUESTIONS - For further details regarding operation or servicing of the receiver, contact your dealer. Make no shipments directly to the factory as the factory does not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER. For the location of the SERVICE CENTER nearest you; consult your dealer, telephone directory or look for the sign shown at the right.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



92X1401



92C890-0

FIG. 4 TUBE LOCATION

ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED

1. Signal generator, with amplitude modulated output, covering 455 KC to 30 MC. Use a modulated output for every step except step 2.
2. Output meter. Connect the meter across the speaker voice coil terminals.
3. Alignment tool made of polystyrene or other similar material.

It is necessary to remove the chassis from the cabinet to make the alignment. The procedure for removing the chassis is as follows: (1) Remove the control knobs (2) Remove the knurled mounting nut from the PHONES jack (3) Remove the control panel escutcheon (4) Remove the hex nut from the PHONES jack (5) Disconnect the BATTERY CABLE PLUG and remove the battery from the compartment (6) Unsolder the whip antenna lead and the two loop antenna connections (7) Remove the two mounting screws from the chassis angle brackets and (8) Remove the chassis from the cabinet.

The alignment should be made with the VOLUME control fully clockwise, the VOICE/CODE control at VOICE and the BAND SPREAD dial pointer at 0. Refer to Figs. 5 and 6 for the location of all adjustments.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR CONNECTIONS	SIGNAL GEN. FREQUENCY	BAND SELECTOR SETTING	TUNING DIAL SETTING	ADJUST	REMARKS
1	Connect the high side of the generator to stator plates of center section of TUNING gang. Connect the ground side of the generator to the chassis.	455 KC	1	1000 KC	A,B,C,D	Adjust for maximum audio output at the speaker voice coil. Use just enough signal generator output to obtain a 50 milliwatt reading on the output meter.
2*	Same as STEP 1.	455 KC (No Mod.)	1	1000 KC	E	Set the VOICE/CODE control at CODE. Adjust E for a 1000 cycle note.
3	Connect a 10 mmf. capacitor from the external antenna lead (located in battery compartment) to the chassis. Connect the high side of the generator to the ext. ant. lead through a 15 mmf. capacitor and the ground side to the chassis.	30 MC 12 MC	4 4	30 MC 12 MC	F, G, H S1, S2, S3	Maximum output as in STEP 1.
4	Same as STEP 3.	11.5 MC 5 MC	3 3	11.5 MC 5 MC	I, J, K S4, S5, S6	Maximum output as in STEP 1.
5	Same as STEP 3.	4.4 MC 1800 KC	2 2	4.4 MC 1.8 MC	L, M, N S7	Maximum output as in STEP 1.
6	Same as STEP 3. The loop antenna should be connected for this step.	1500 KC 600 KC	1 1	1.5 MC .6 MC	O, P, Q R	Maximum output as in STEP 1.

* Reset the VOICE/CODE control at VOICE when STEP 2 is completed.

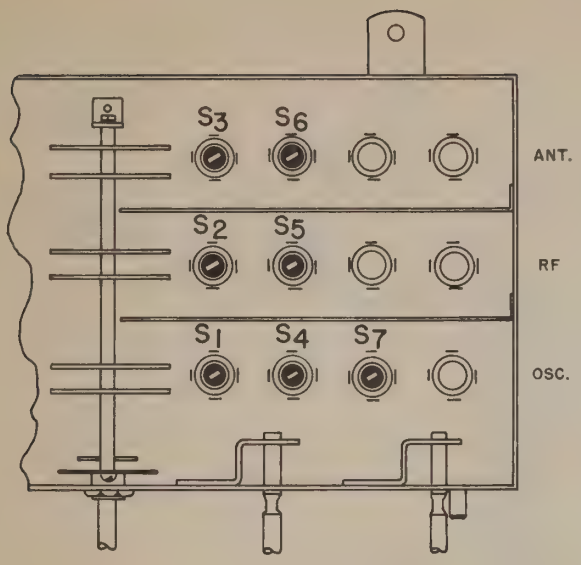


FIG. 5 BOTTOM VIEW - ALIGNMENT POINTS

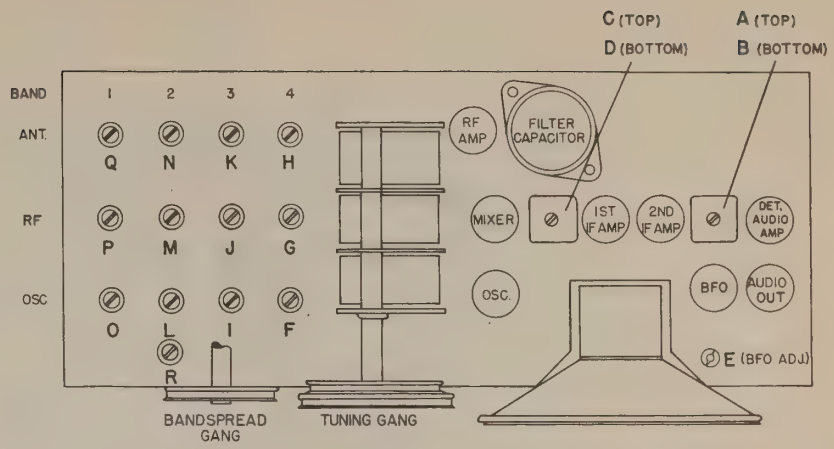
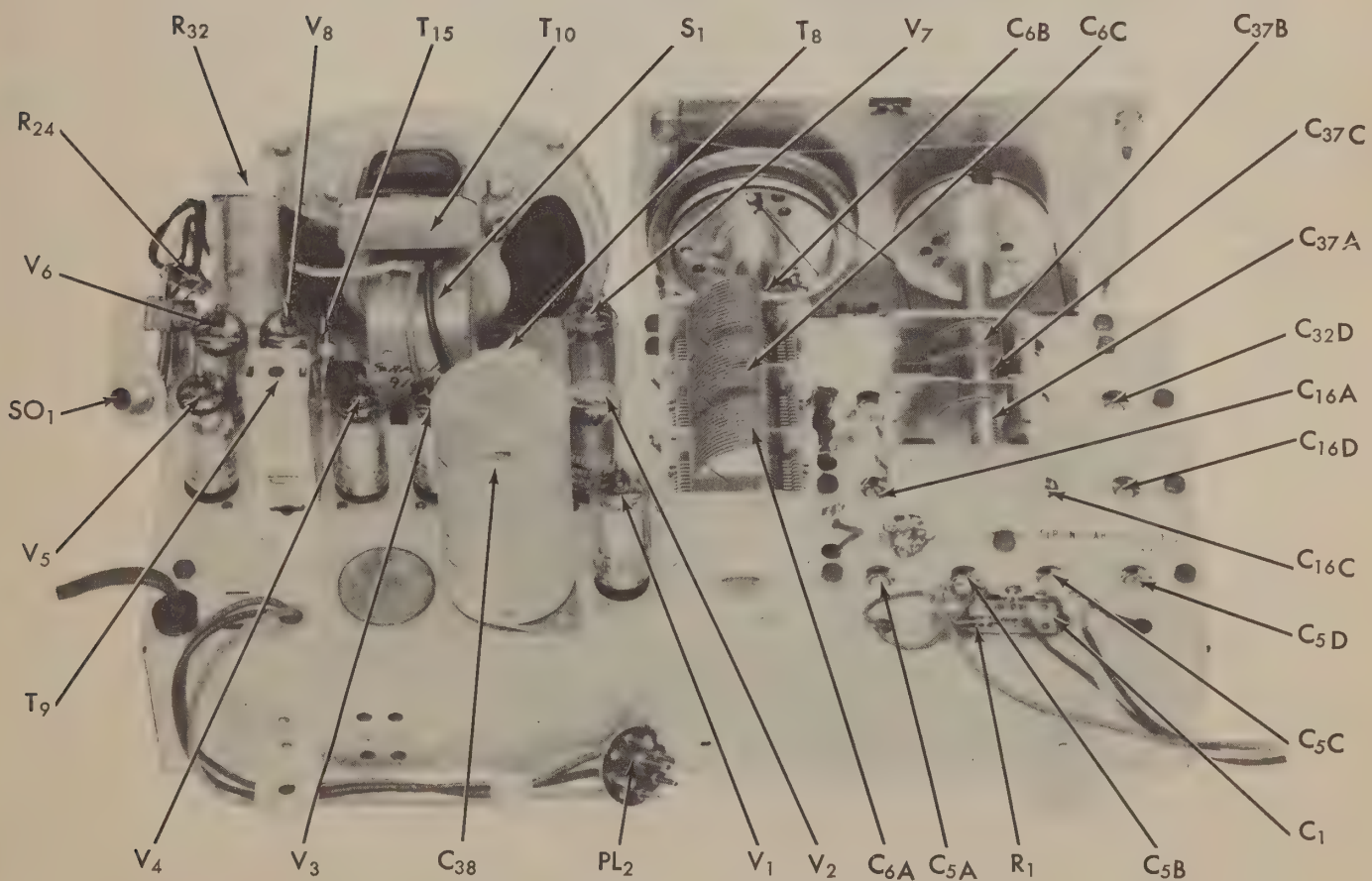
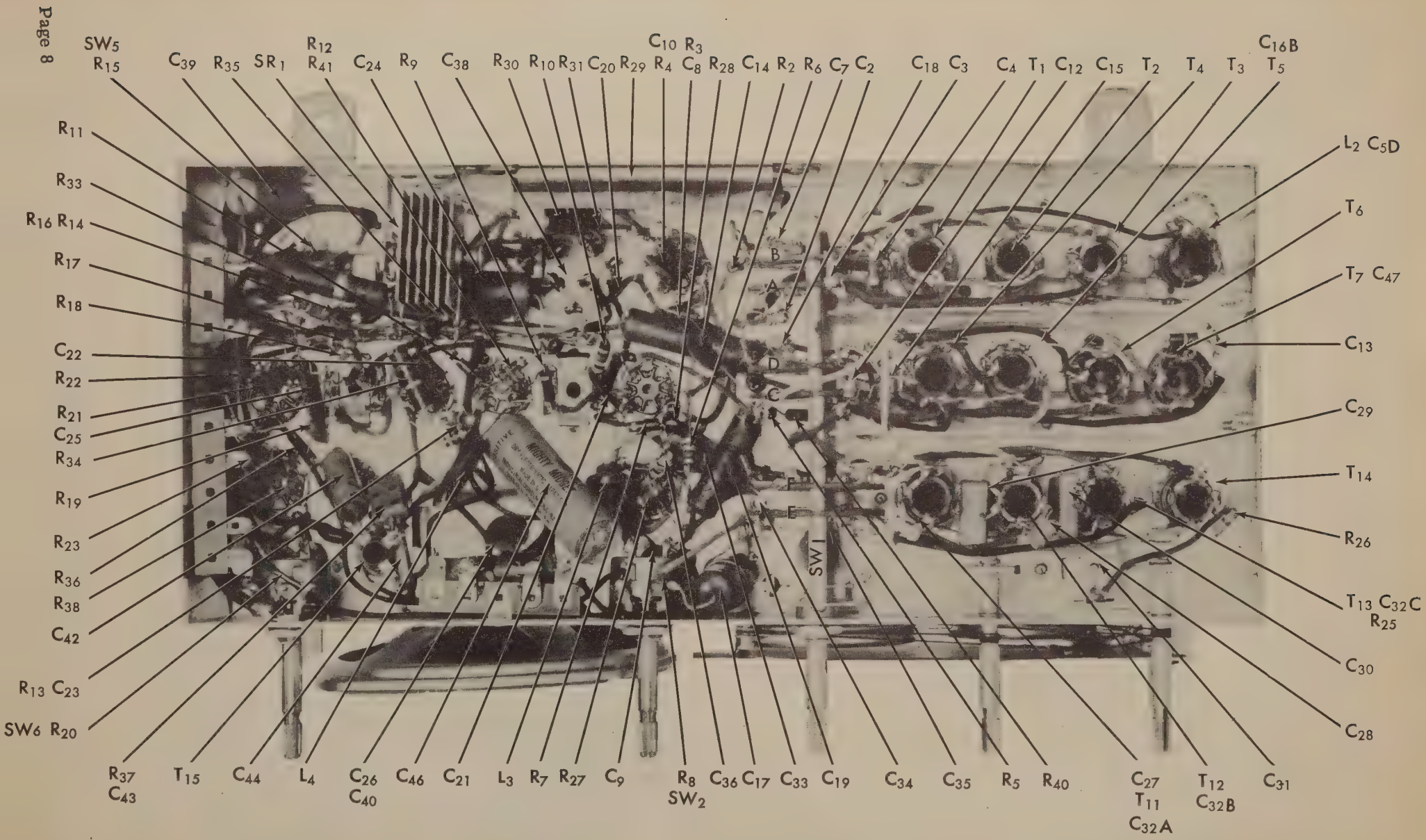


FIG. 6 TOP VIEW - ALIGNMENT POINTS



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FIG. 7 TOP VIEW - COMPONENT LOCATION

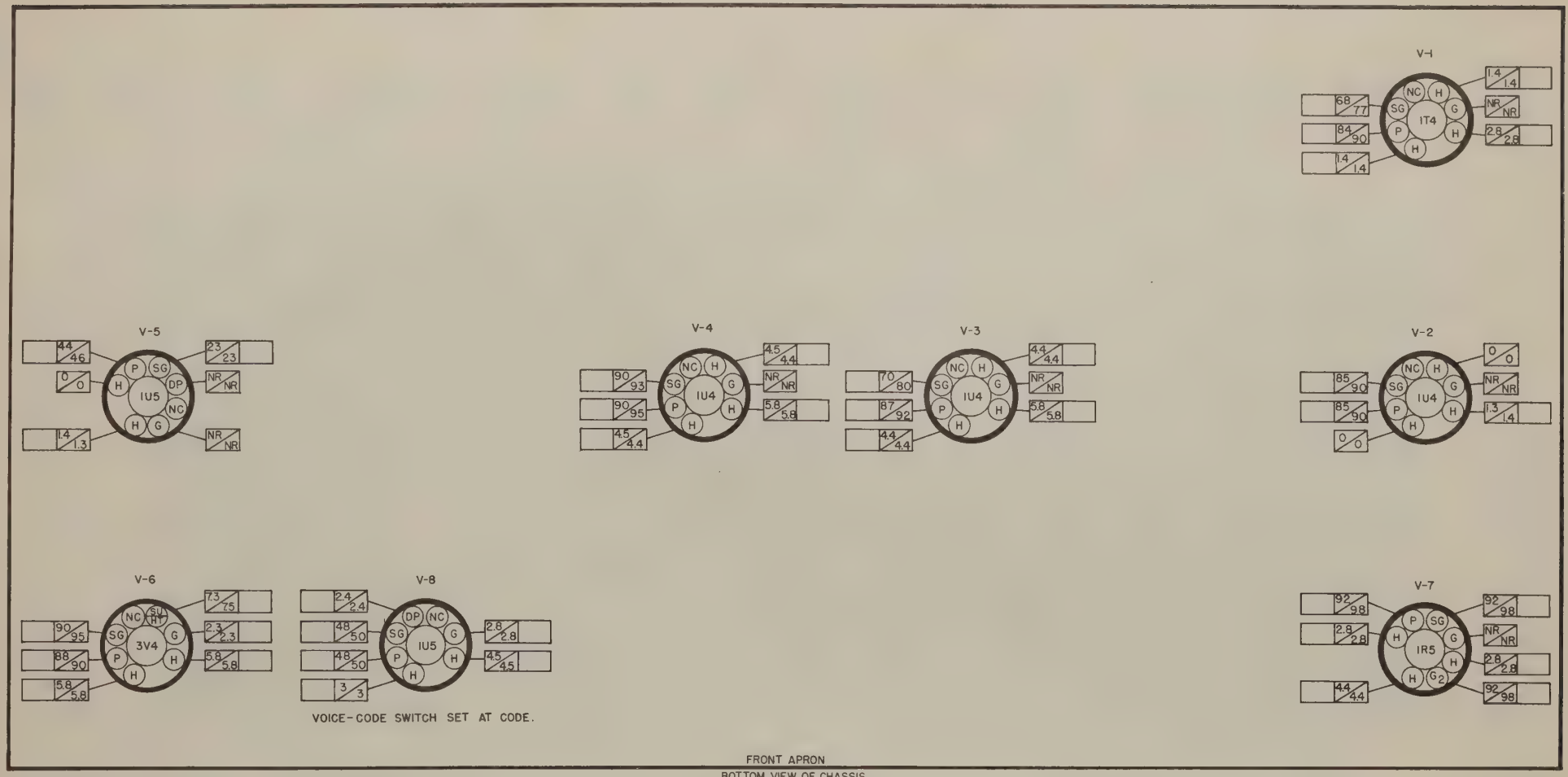


92X1150-A

FIG. 8 BOTTOM VIEW - COMPONENT LOCATION

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,33,42	.003 mfd. 600 V., tubular	46AZ302J
C-2,13,23, 34	100 mmf. 500 V., ceramic	47B20101K5
C-3,4,15	15 mmf. 500 V., ceramic	47B20150K5
C-5	Trimmer assembly, antenna stage; 4 sections	44B374-1
C-6	TUNING capacitor, 3 sections	48C221
C-7,18	68 mmf. 500 V., ceramic	47B20680K5
C-8	.05 mfd. 200 V., tubular	46AU503J
C-9,10,14, 20,21,22, 26,35	5000 mmf. 500 V., ceramic disc	47A168
C-12	47 mmf. 500 V., ceramic	47B20470K5
C-16	Trimmer assembly, RF stage; 4 sections	44B374-2
C-17	Resonant capacitor, 455 KC	46A174
C-19	.01 mfd. 600 V., tubular	46AY103J
C-24	.1 mfd. 200 V., tubular	46AU104J
C-25	Composite capacitor; 2000 - 5000 - 100 - 5000 mmf. 500 V., ceramic	47A203
C-27	22 mmf. 500 V., ceramic	47B20220K5
C-28	50 mmf. 500 V., ceramic	47B20500K5
C-29	3900 mmf. 500 V., mica	47X35A392J
C-30	1400 mmf. 500 V., mica	47X30A142J
C-31	Padder, 450 mmf.; includes mtg. bracket	44A376
C-32	Trimmer assembly, oscillator stage; 4 sections	44B374
C-36	7 mmf. 500 V., ceramic	47X20UK070K
C-37	BAND SPREAD capacitor, 3 sections	48C227
C-38	60 - 20 - 20 mfd. 150 V., 2000 mfd. 15 V.; electrolytic	45B162
C-39	.02 mfd. 600 V., molded tubular	46BR203L6
C-40	.02 mfd. 200 V., tubular	46AU203J
C-43	100 mmf. 500 V., mica	47X20A101M
C-44	470 mmf. 500 V., mica	47X20A471K
C-46	100 mfd. 25 V., electrolytic	45A116
C-47	5.6 mmf. 500 V., bakelite	47A160-7
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103K
R-2,6,10, 13,14,15	4.7 megohms 1/2 watt, carbon	23X20X475M
R-3	150 ohms 1/2 watt, carbon	23X20X151K
R-4,37	22,000 ohms 1/2 watt, carbon	23X20X223K
R-5,19	470 ohms 1/2 watt, carbon	23X20X471K
R-7,24	100 ohms 1/2 watt, carbon	23X20X101K
R-8	500,000 ohms, sensitivity control (R-8 includes VOICE/CODE switch SW-2)	25B847
R-9	2200 ohms 1/2 watt, carbon	23X20X222K
R-11	100,000 ohms 1/2 watt, carbon	23X20X104K
R-12	6800 ohms 1/2 watt, carbon	23X20X682K
R-16,23	2.2 megohms 1/2 watt, carbon	23X20X225M
R-17,27,38	47,000 ohms 1/2 watt, carbon	23X20X473K
R-18,22	470,000 ohms 1/2 watt, carbon	23X20X474K
R-20	2 megohms, VOLUME control (R-20 includes switch SW-6)	25B839
R-21	3.3 megohms 1/2 watt, carbon	23X20X335M
R-25	330 ohms 1/2 watt, carbon	23X20X331K
R-26	680 ohms 1/2 watt, carbon	23X20X681K
R-28,40	47 ohms 1/2 watt, carbon	23X20X470K
R-29	270 ohms 2.3 watts, 350 ohms 5.5 watts; wirewound	24A912
R-30,34	560 ohms 1 w , carbon	23X30X561K
R-31	680 ohms 1 w , carbon	23X30X681K
R-32	600 ohms 9.3 tts; wirewound	24A913
R-33	22 ohms 2 watts, wirewound	24BV220E
R-35	1200 ohms 1/2 watt, carbon	23X20X122K
R-36	33 ohms 1/2 watt, carbon	23X20X330K
	COILS AND TRANSFORMERS	
T-1	Coil, antenna; band 4	51B1251
T-2	Coil, antenna; band 3	51B1250
T-3	Coil, antenna; band 2	51B1137
T-4	Coil, RF; band 4	51B1252
T-5	Coil, RF; band 3	51B1253
T-6	Coil, RF; band 2	51B1248
T-7	Coil, RF; band 1	51B1247
T-8	Transformer, 1st IF	50C233
T-9	Transformer, 2nd IF	50C234
T-10	Transformer, audio output (part of speaker assembly LS-1)	- - - -
T-11	Coil, oscillator; band 4	51B1249
T-12	Coil, oscillator; band 3	51B1254
T-13	Coil, oscillator; band 2	51B1255
T-14	Coil, oscillator; band 1	51B1144
T-15	Coil, BFO (includes mtg. clip)	50B402
L-1	Loop antenna	57C125
L-2	Coil, antenna loading; band 1	51B1136
L-3	Choke, RF	53A008
L-4	Choke, filament	53A121
	SWITCHES	
SW-1	Switch assembly, BAND SELECTOR; 6 sections	60C362
SW-2	Switch, VOICE/CODE; dpst (part of sensitivity control R-8)	- - - -
SW-5	Switch, AC/DC - BATTERY change over; 3 pdt	60A363
SW-6	Switch, ON-OFF; dpst (part of VOLUME control R-20)	- - - -
	PLUGS AND SOCKETS	
PL-1	Line cord and plug	87B1683
PL-2	Plug, battery; 6 pin	10A344
SO-1	Jack, PHONES	36A036
	Socket, 7 pin miniature tube	6B300
	TUBES AND RECTIFIERS	
V-1	1T4: RF amplifier	90X1T4
V-2;3,4	1U4: mixer; 1st and 2nd IF amplifiers	90X1U4
V-5;8	1U5: detector and audio amplifier; beat frequency oscillator	90X1U5
V-6	3V4: audio output	90X3V4
V-7	1R5: oscillator	90X1R5
SR-1	Selenium rectifier, 150 ma	27A151
	MISCELLANEOUS	
	Antenna, whip	57B142
	Cabinet	78F491
	Clip, mtg.; for T-8 and T-9	76A385
	Dial cord, 51" (for band spread pointer and gang drive and main tuning gang drive)	38A001
	Dial cord, 28" (for main tuning pointer drive)	38A017
	Dial scale	83C355
	Escutcheon	7D109
	Grille cloth	14B180
	Grommet, rubber; (used on front apron of chassis)	16A145
	Grommet, rubber (used for mounting C-6 and LS-1)	16A128
	Insulator, whip antenna	65A534
	Knob, TUNING and BAND SPREAD	15B172
	Knob, BAND SELECTOR, VOICE/CODE and ON-OFF VOLUME	15B177
	Lock, line cord; male	76A397-1
	Lock, line cord; female	76A397-2
	Plate, mtg. (for mounting C-38)	8A749
	Pointer, band spread	82A161-1
	Pointer, main tuning	82A161
	Shaft, main tuning and band spread	74A274
LS-1	Speaker, 5" PM (includes output transformer T-10 and mtg. bracket)	85C093
	Spring, dial drive	75A012
	Strap, battery mtg.	76B467
	Window, dial	22B250

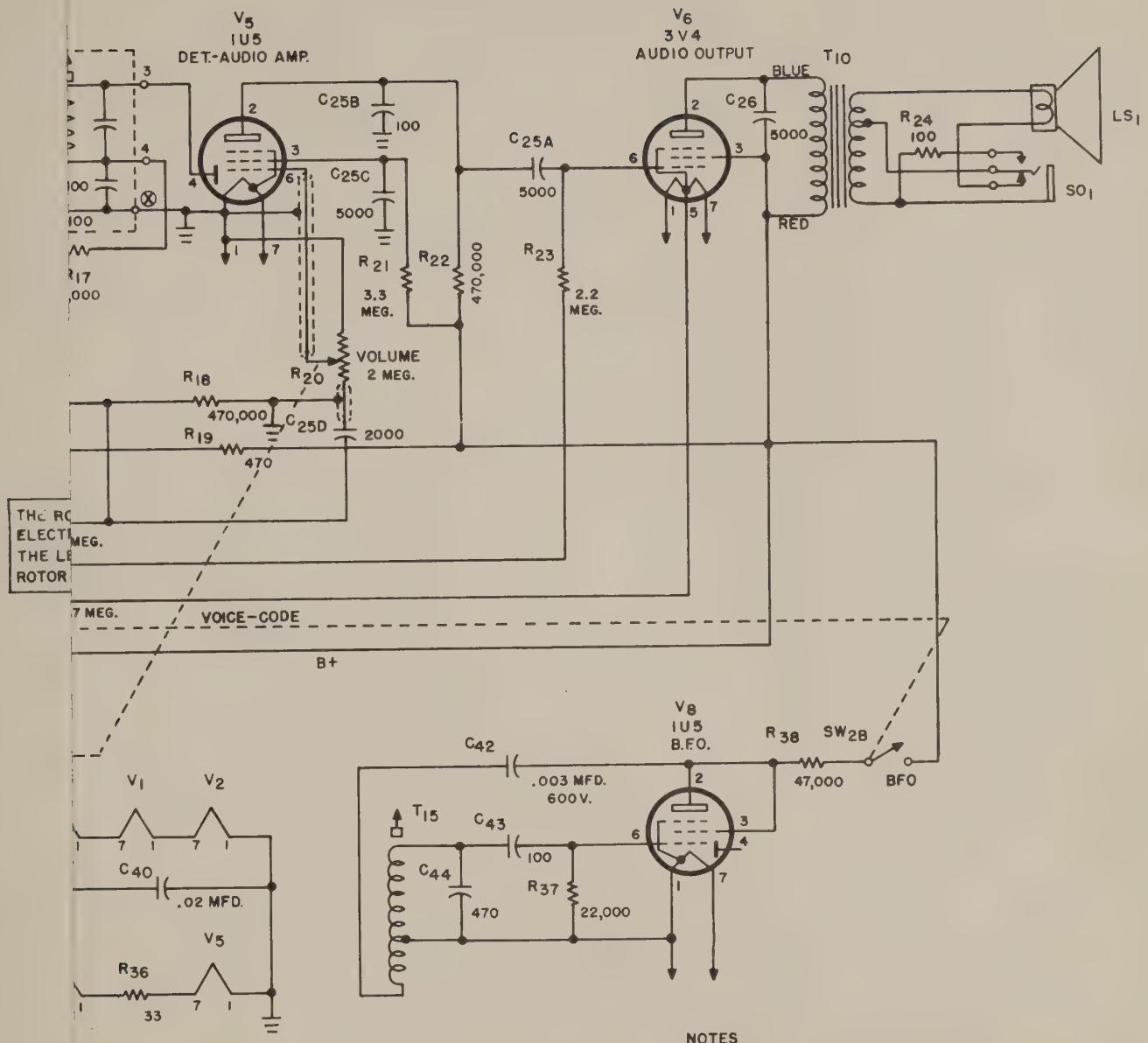


NOTES —

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & B−, THE ELECTRICAL GROUND BUS (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE — 117 V. AC. BATTERY VOLTAGES TAKEN WITH FRESH BATTERY PACK.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC" — NO CONNECTION.
7. "NR" — NOT READABLE (READING GENERALLY MEANINGLESS.)
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS.
9. ▱ UPPER VOLTAGE READINGS IN INDICATOR SPACE SHOW BATTERY OPERATION.
10. VOLTAGES FOR TUBE V-8, ARE SHOWN WITH VOICE-CODE SWITCH IN CODE POSITION.
11. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUS & CHASSIS ARE AT SAME POTENTIAL AS THE CHASSIS GROUND.

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FIG. 9 TUBE SOCKET VOLTAGE CHART



105-125 VOLTS

DC OR 50-60 CYCLE AC.

PL1

NOTES

1. ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
2. CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
3. BAND SELECTOR SWITCH SW1 SHOWN IN BAND I POSITION (FULLY CLOCKWISE).
4. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.

⏚ - INDICATES ELECTRICAL GROUND BUS (B-).

⏚ - INDICATES CHASSIS GROUND.

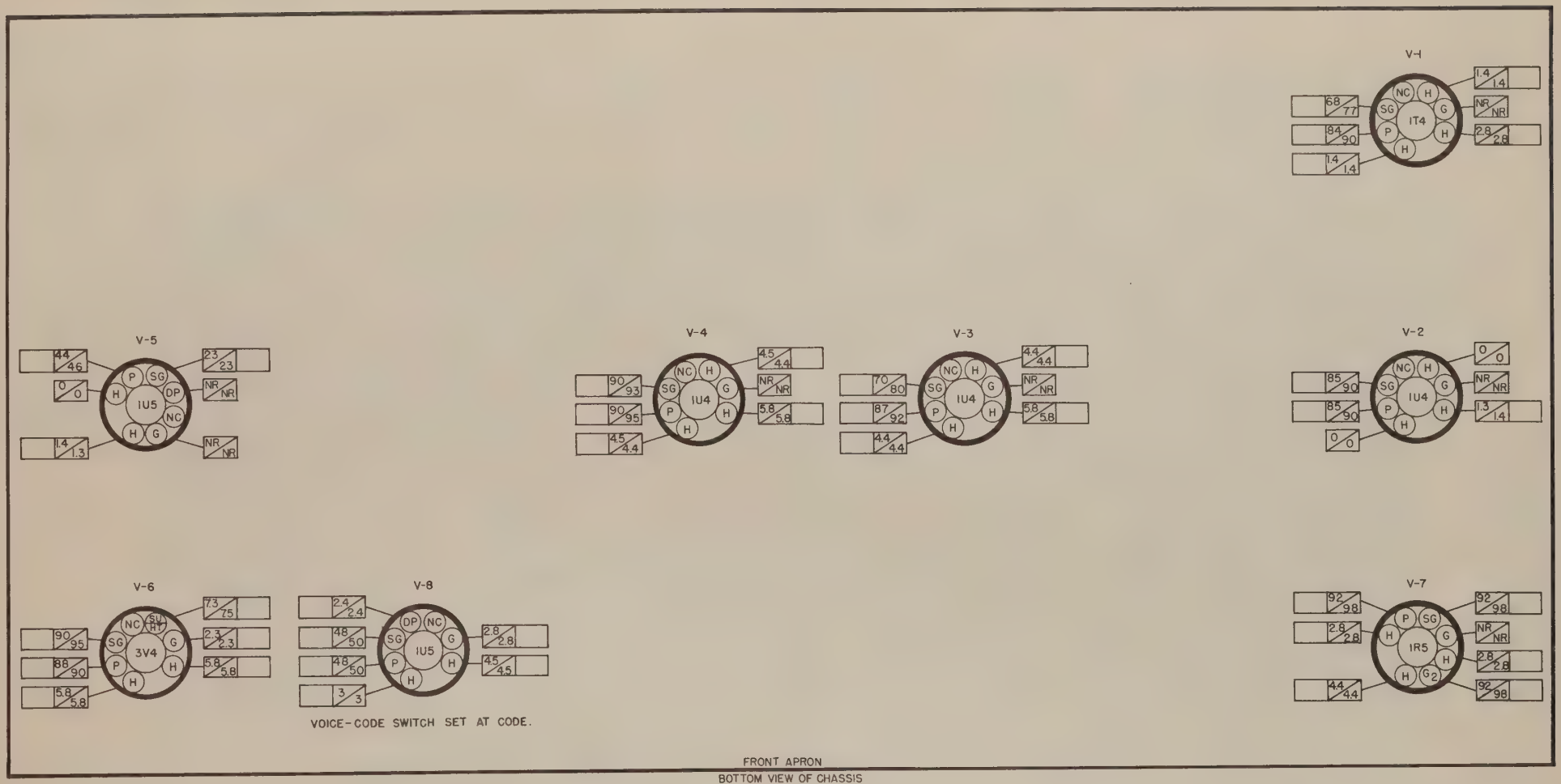
* OPERATION SWITCH (SW5) SHOWN IN AC/DC POSITION. INSERTING AC POWER PLUG (PL1) IN THE RECEPTACLE ON THE CHASSIS PLACES SWITCH SW5 IN THE BATTERY POSITION.

◉ SWITCH SW6 GANGED WITH VOLUME CONTROL.

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IONS MAY BE FOUND. IT
INT CORRESPOND TO

FIG. 10 SCHEMATIC DIAGRAM

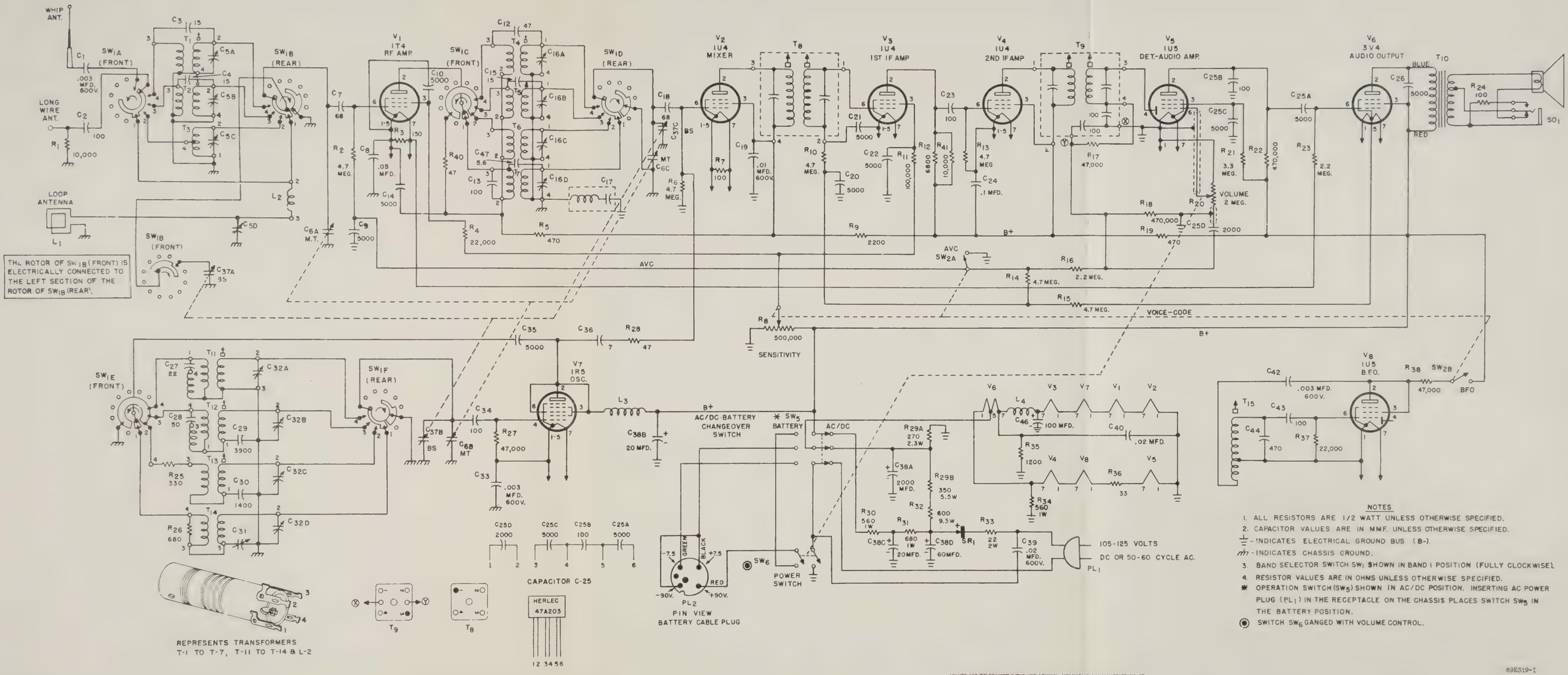


NOTES—

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & B−, THE ELECTRICAL GROUND BUS (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE—117V. AC. BATTERY VOLTAGES TAKEN WITH FRESH BATTERY PACK.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER.
6. "NC"—NO CONNECTION.
7. "NR"—NOT READABLE (READING GENERALLY MEANINGLESS.)
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS.
9. ▱ UPPER VOLTAGE READINGS IN INDICATOR SPACE SHOW BATTERY OPERATION.
10. VOLTAGES FOR TUBE V-8, ARE SHOWN WITH VOICE-CODE SWITCH IN CODE POSITION.
11. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUS & CHASSIS ARE AT SAME POTENTIAL AS THE CHASSIS GROUND.

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FIG. 9 TUBE SOCKET VOLTAGE CHART



NOTES

1. ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
2. CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
   ⏚ - INDICATES ELECTRICAL GROUND BUS (B-).
   ⏥ - INDICATES CHASSIS GROUND.
3. BAND SELECTOR SWITCH SW_1 SHOWN IN BAND 1 POSITION (FULLY CLOCKWISE).
4. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
* OPERATION SWITCH (SW_5) SHOWN IN AC/DC POSITION. INSERTING AC POWER PLUG (PL_1) IN THE RECEPTACLE ON THE CHASSIS PLACES SWITCH SW_5 IN THE BATTERY POSITION.
◉ SWITCH SW_6 GANGED WITH VOLUME CONTROL.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

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FIG. 10 SCHEMATIC DIAGRAM

SHORTWAVE STATION LOG

STATION	CITY	TIME	BAND	TUNING DIAL SETTING	BAND SPREAD DIAL SETTING

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X782
751 RUN 3

communications

SERVICE INSTRUCTIONS

S-77

the hallicrafters co.



Radio Receiver Model S-77, front view.

GENERAL SPECIFICATIONS

Tubes	Seven plus rectifier
Speaker	5-inch PM
Speaker V.C. Impedance	3.2 ohms
Headset Output	Low Impedance
Antenna	Provision for external antenna
Tuning	Manual
Intermediate Frequency	455 kc
Power Supply	105-125 V. DC/60 cycles AC (using 117 V. ballast tube, R-38) or 210-250 V. DC/60 cycles AC (using 220 V. ballast tube, R-39)
Power consumption	40 Watts

TUNING RANGE

Band Selector Position	Frequency Range
1.	540 kc - 1680 kc
2.	1680 kc - 5.4 mc
3.	5.3 mc - 15.5 mc
4.	15.5 mc - 44 mc

SERVICE INSTRUCTIONS

RESTRINGING DIAL CORD

To restring the main tuning dial cord, cut a 15-inch length of 30 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Follow the numbers "1" through "4", and at position "4" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord cut a 22-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

REPLACING LAMPS

Refer to Fig. 7 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. G.E. #47 (brown bead) lamps or equivalent.

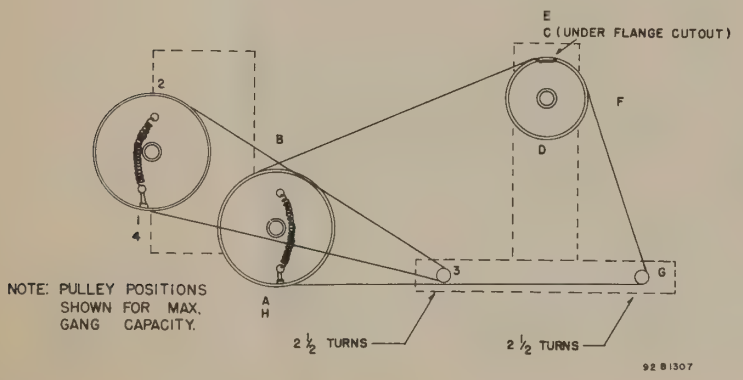


FIG. 1. DIAL CABLE STRINGING PROCEDURE

ALIGNMENT PROCEDURE

For I-F amplifier alignment it will be necessary to remove the receiver chassis from the cabinet. The chassis is held in the cabinet by three screws along both the bottom edge of the front panel and the rear of the cabinet, and two screws on either side of the front panel.

NOTE - R-F alignment should be accomplished through the holes provided in the cabinet bottom as the oscillator calibration will be effected slightly by changes in the capacity between the cabinet bottom and the r-f coils and wiring.

Before starting the alignment procedure, check the position of the main tuning index marker on the low frequency end of the range and set the bandspread dial on zero position. The main tuning condenser should index at max. capacity, and the bandspread condenser at min. capacity.

The standard RMA dummy antenna mentioned in the alignment chart consists of a 200 mmf. condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf. condenser in series with a 400 ohm carbon resistor.

Set the following controls before alignment

SENSITIVITY	Set at maximum
VOLUME	Set at maximum
AVC switch	Set at OFF
BAND SPREAD	Set at zero
CW/AM	Set at AM (See Step 2)
NOISE LIMITER	Set at OFF
STANDBY/RECEIVE	Set at RECEIVE
TONE SWITCH	Set at HIGH

For the settings of the remaining controls, see alignment chart.

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust	Remarks
1	None	Stator plates in center section of tuning gang.	455 kc	"1"	1000 kc	A,B,C, D,E,F	Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 MW signal level.
2	None	See step 1	455 kc (No modulation)	"1"	1000 kc	G	With the CW/AM switch set at CW, remove the pitch control knob and adjust "G" for zero beat. Replace the knob with the dot on the center position.
3	Std RMA dummy	"A1" on antenna strip. Jumper connected between "A2" and "G".	36 mc	"4"	36 mc	*H,I,J	Maximum output as in step 1.
			18 mc		18 mc	*K,L,M	
4	Std RMA dummy	See step 3	14 mc	"3"	14 mc	*N,O,P	Maximum output as in step 1.
			10 mc		10 mc	*Q,R,S	
5	Std RMA dummy	See step 3	5 mc	"2"	5 mc	*T,U,V	Maximum output as in step 1.
			1.8 mc		1.8 mc	*W	
6	Std RMA dummy	See step 3	1500 kc	"1"	1500 kc	*X,Y,Z	Maximum output as in step 1.
			600 kc		600 kc	*Z'	

*Note - Calibration adjustments.

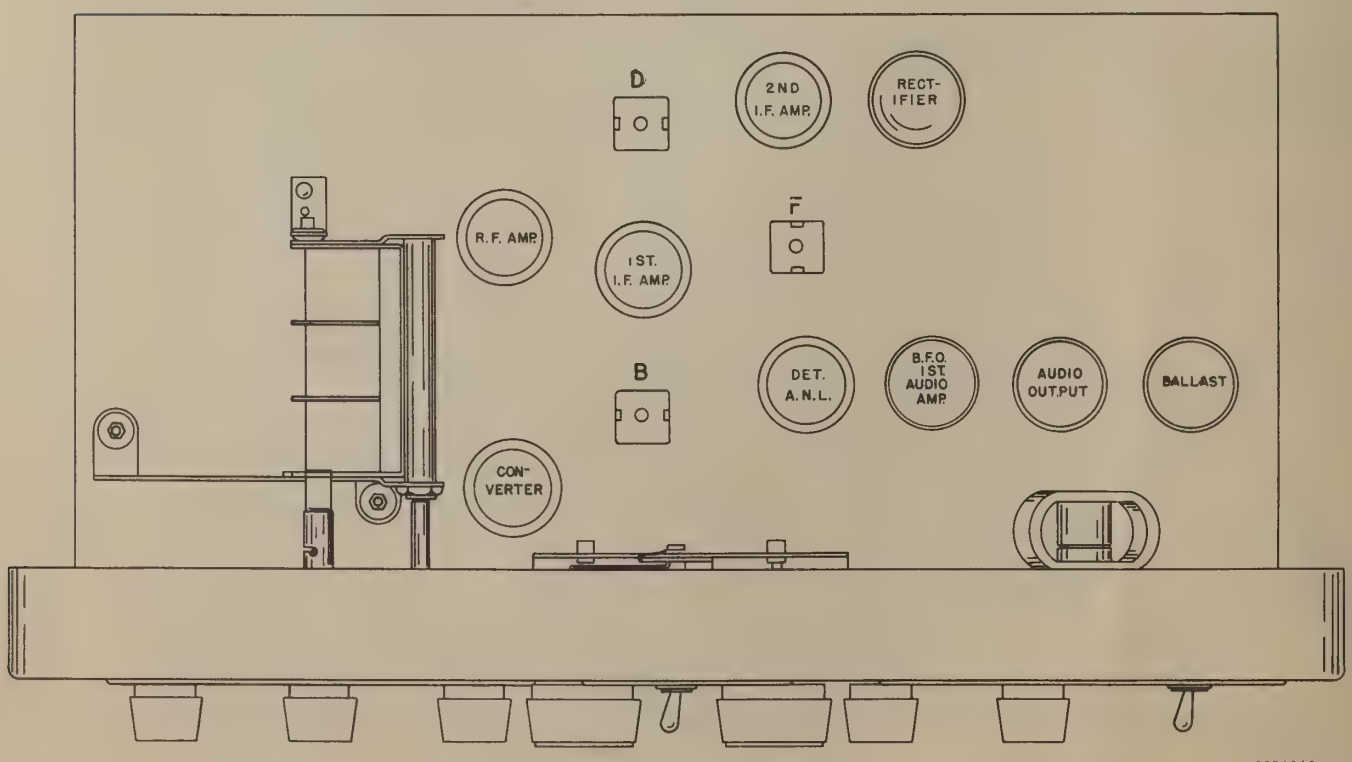


FIG. 2. TOP VIEW, ALIGNMENT POINTS

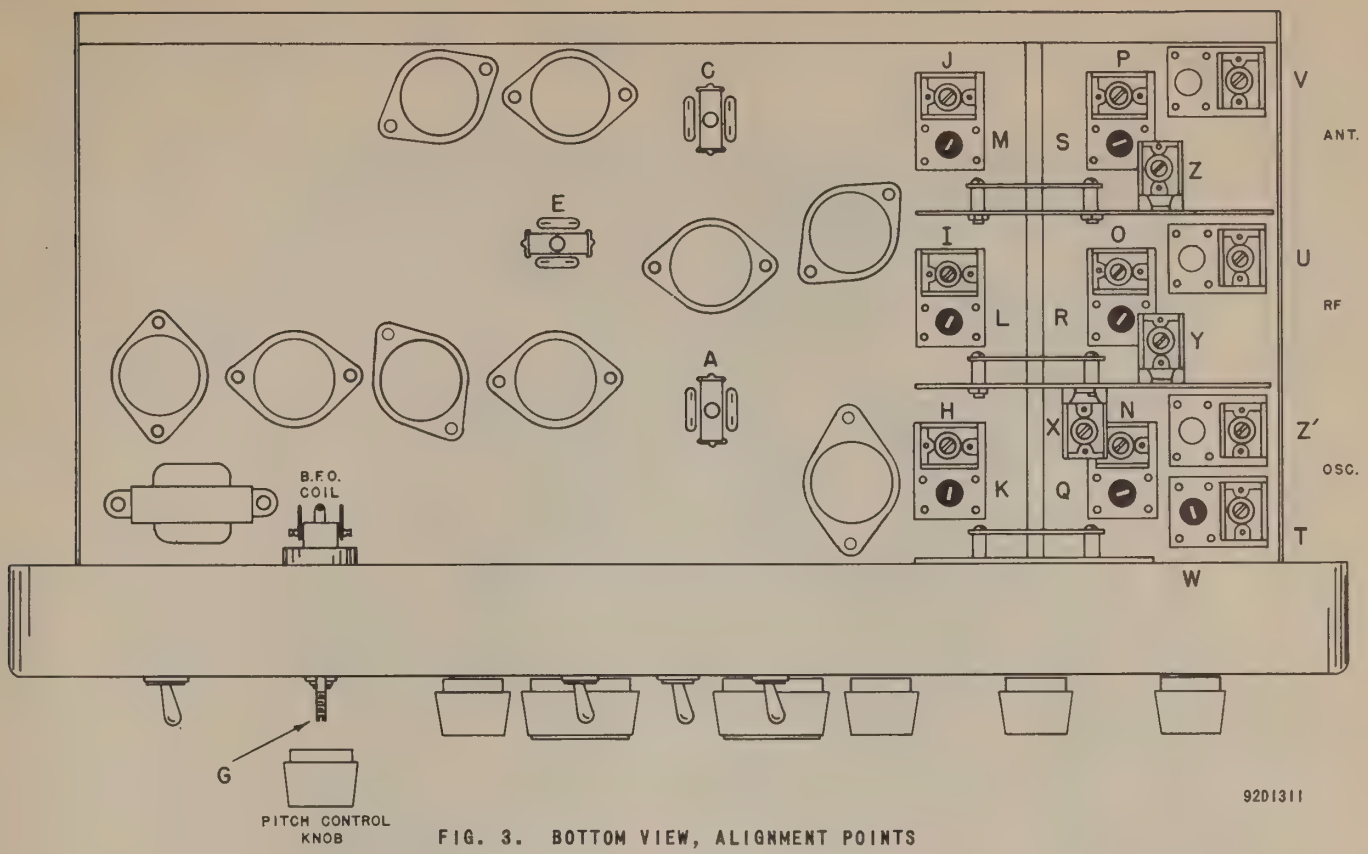


FIG. 3. BOTTOM VIEW, ALIGNMENT POINTS

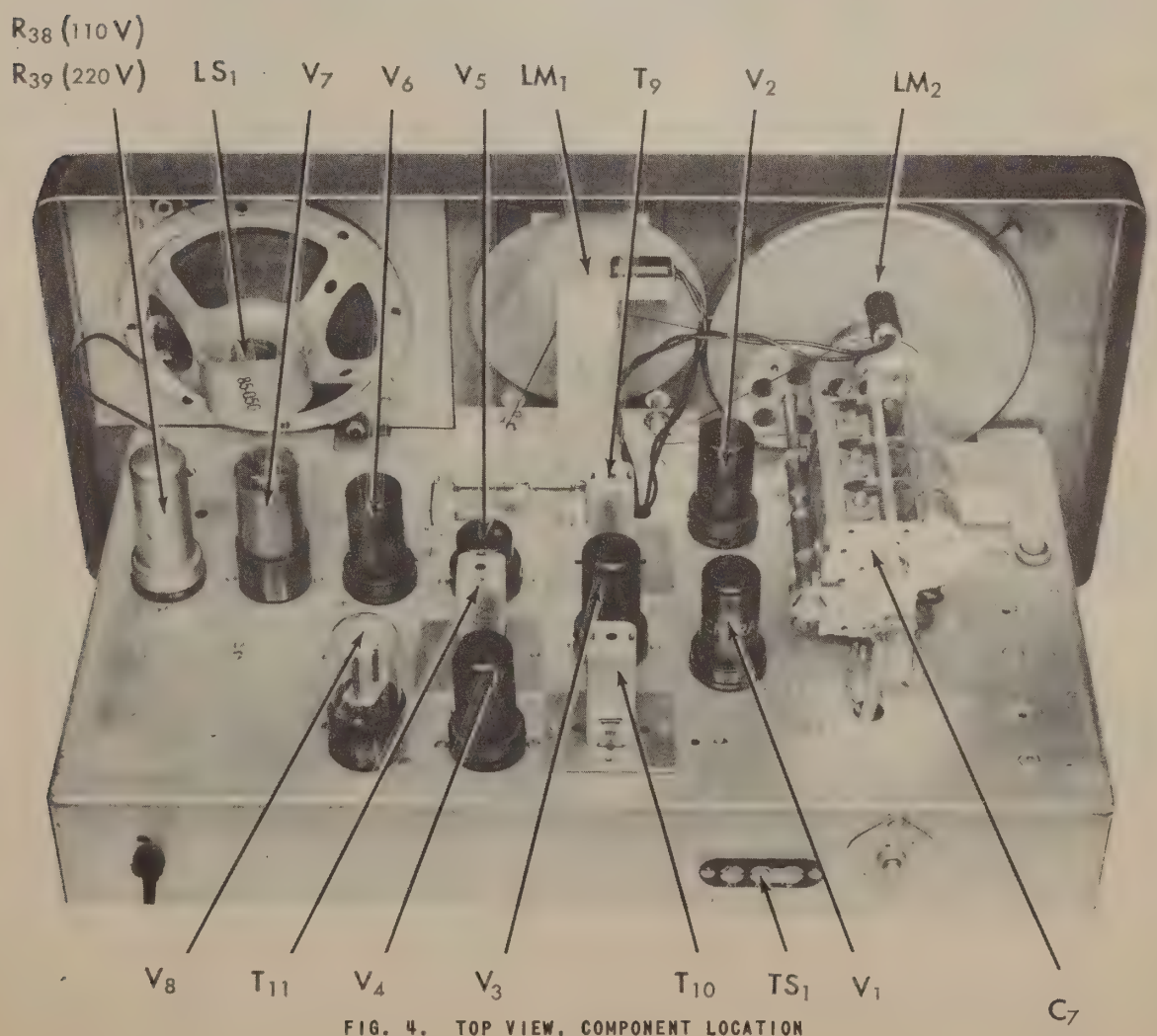
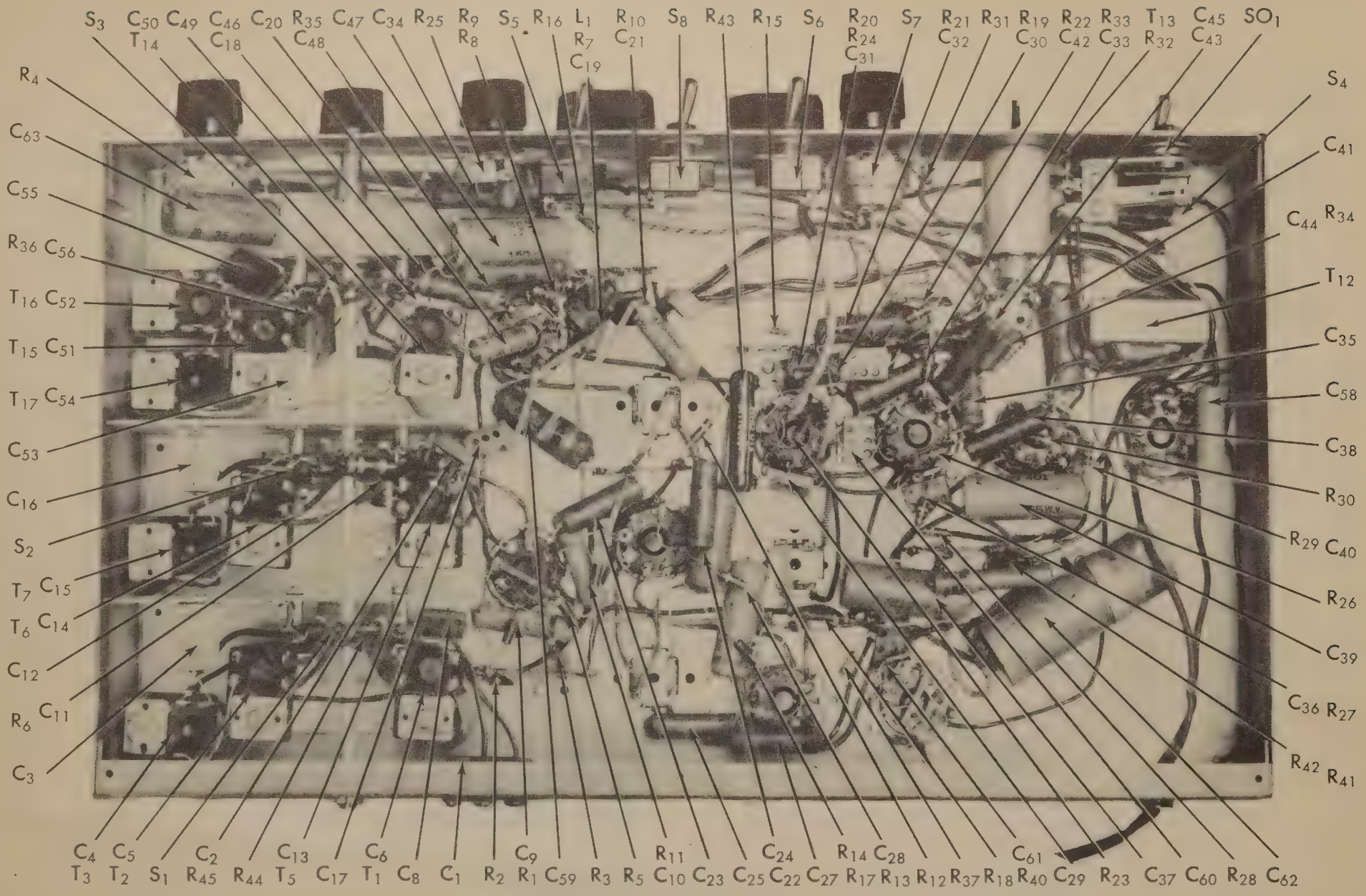


FIG. 4. TOP VIEW, COMPONENT LOCATION



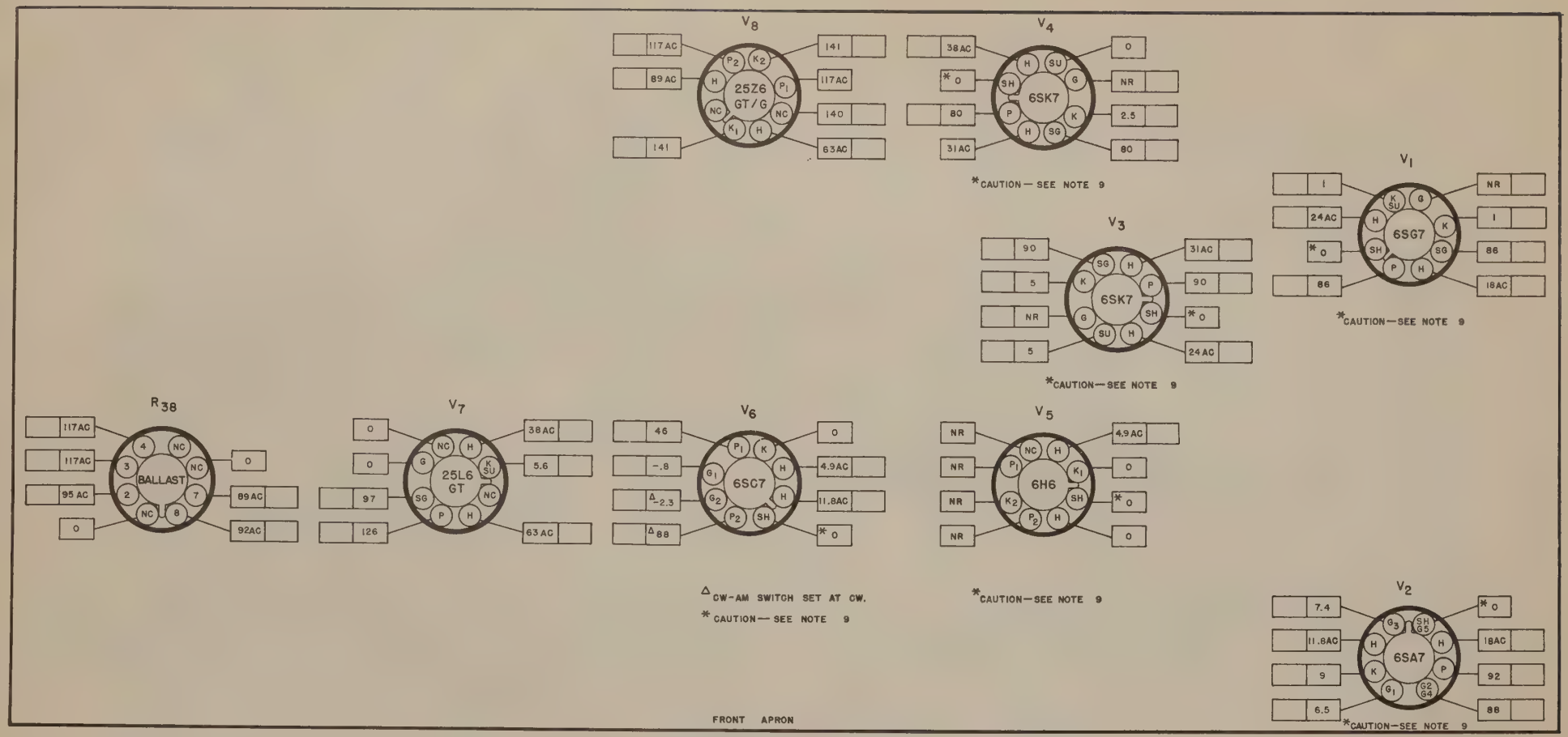
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FIG. 5. BOTTOM VIEW, COMPONENT LOCATION

SERVICE PARTS LIST

Ref. No.	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,9,10,21, 23,38,43	.01 mfd. 600V., tubular paper	46AZ103J
C-2,42,60	100 mmf. 500V., mica	47X20B101K
C-3,16,53	Trimmer, 2-20 mmf.	44A191
C-4	Trimmer (part of coil T-3)	
C-5	Trimmer (part of coil T-2)	
C-6	Trimmer (part of coil T-1)	
C-7	Tuning capacitor, 3 section; ganged	48C240-B
C-8,17,36, 61	220 mmf. 500V., mica	47X20B221K
C-11	24 mmf., ceramic	47X25UK240M
C-12	15 mmf., ceramic	47X21UK150M
C-13	Trimmer (part of coil T-5)	
C-14	Trimmer (part of coil T-6)	
C-15	Trimmer (part of coil T-7)	
C-18,44	270 mmf. 500V., mica	47X20B271K
C-19,40	.005 mfd. 600V., tubular paper	46AZ502J
C-20,35	.003 mfd. 600V., tubular paper	46AY302J
C-22,25,27, 33,34	.02 mfd. 200V., tubular paper	46AU203J
C-24,28,41	.05 mfd. 600V., tubular paper	46AY503J
C-26,57	2 mmf., wire gimmick	
C-29,30	47 mmf. 500V., mica	47X20B470K
C-31,32,48	.05 mfd. 200V., tubular paper	46AU503J
C-37	.1 mfd. 600V., tubular paper	46AY104J
C-39	10 mfd. 25V., electrolytic	45A121
C-45	470 mmf. 500V., mica	47X20B471J
C-46	.002 mfd. 600V., tubular paper	46AZ202J
C-47	10 mfd. 150V., electrolytic	45A097
C-49	68 mmf., ceramic	47X25UK680K
C-50	Trimmer (part of coil T-14)	
C-51	Trimmer (part of coil T-15)	
C-52	Trimmer (part of coil T-16)	
C-54	Padder (part of coil T-17)	
C-55	1500 mmf. 500V., mica	47X35C152J
C-56	3000 mmf. 500V., mica	47X35B302K
C-58	.02 mfd. 600V., molded tubular paper	46BR203L6
C-59	Resonant capacitor (.05 mfd. 600V.)	46A150
C-62	60-20-20 mfd. 150V., electrolytic	45B128-C
C-63	.25 mfd. 200V., tubular paper	46AT254J
	RESISTORS	
R-1	22 ohms 1/2 watt, carbon	23X20X220K
R-2,7,20	1 megohm 1/2 watt, carbon	23X20X105M
R-3	120 ohms 1/2 watt, carbon	23X20X121K
R-4	10,000 ohms; SENSITIVITY control	25B590
R-5,10,11, 14,18,35, 44	1000 ohms 1/2 watt, carbon	23X20X102K
R-6,45	6800 ohms 1 watt, carbon	23X30X682K
R-8	18,000 ohms 1/2 watt, carbon	23X20X183K
R-9	6.8 ohms 1/2 watt, carbon	23X20X068K
R-12,21,28	100,000 ohms 1/2 watt, carbon	23X20X104M
R-13,17	330 ohms 1/2 watt, carbon	23X20X331K
R-15,23	2.2 megohms 1/2 watt, carbon	23X20X225M
R-16,30	150 ohms 1/2 watt, carbon	23X20X151K
R-19,34	47,000 ohms 1/2 watt, carbon	23X20X473K
R-22,27	330,000 ohms 1/2 watt, carbon	23X20X334M
R-24,29	470,000 ohms 1/2 watt, carbon	23X20X474M
R-25	500,000 ohms; VOLUME control	25B586
R-26	10 megohms 1/2 watt, carbon	23X20X106M
R-31	4700 ohms 1/2 watt, carbon	23X20X472K
R-32	15 ohms 1 watt, carbon	23X30X150M
R-33	15,000 ohms 1/2 watt, carbon	23X20X153K
R-36	10 ohms 1/2 watt, carbon	23X20X100K
R-37	270,000 ohms 1/2 watt, carbon	23X20X274M
R-38	Ballast tube (117V.)	24B875
R-39	Ballast tube (220V.)	24B874
R-40	15 ohms 1/2 watt, carbon	23X20X150K
R-41	100 ohms 1/2 watt, carbon	23X20X101K
R-42	1000 ohms 2 watts, carbon	23X40X102K
R-43	110 ohms 10 watts, WW	24BG111E

Ref. No.	Description	Hallicrafters Part Number
	TRANSFORMERS AND COILS	
L-1	Choke, RF	53A138
T-1	Coil, antenna; band 4	51B783
T-2	Coil, antenna; band 3	51B782
T-3	Coil, antenna; bands 1 and 2	51B1241
T-5	Coil, RF; band 4	51B787
T-6	Coil, RF; band 3	51B786
T-7	Coil, RF; bands 1 and 2	51B1240
T-9,10	Transformer, 1st and 2nd IF	50C243
T-11	Transformer, IF (detector stage)	50C242
T-12	Transformer, audio output	55B110
T-13	Coil, PITCH CONTROL	54B044
T-14	Coil, oscillator; band 4	51B791
T-15	Coil, oscillator; band 3	51B913
T-16	Coil, oscillator; band 2	51B789
T-17	Coil, oscillator; band 1	51B912
	SWITCHES	
S-1	Wafer, bandswitch; antenna stage	60B389
S-2	Wafer, bandswitch; RF stage	62B039
S-3	Wafer, bandswitch; oscillator stage	62B044
S-4,5,6,8,	Switch, toggle (SPST); STANDBY-RECEIVE, A.V.C., A.N.L., and CW-AM	60A138
S-7	Switch, PWR-TONE	60A225
	PLUGS AND SOCKETS	
PL-1	Line cord and plug	87B1573
SO-1	Jack, PHONES	36B004
SO-2	Socket, octal; ballast tube	6A250
	Socket, octal; tube	6A250
	Socket, dial lamp (main tuning dial)	86B101
	Socket, dial lamp (bandspread dial)	68B068
	•TUBES, RECTIFIERS AND DIAL LAMPS	
V-1	Type 6SG7, RF amplifier	90X6SG7
V-2	Type 6SA7, converter	90X6SA7
V-3,4	Type 6SK7, 1st and 2nd IF amplifiers	90X6SK7
V-5	Type 6H6, detector and A.N.L.	90X6H6
V-6	Type 6SC7, audio amp. and B.F.O.	90X6SC7
V-7	Type 25L6GT, audio output	90X25L6GT
V-8	Type 25Z6GT/G, rectifier	90X25Z6GT/G
LM-1,2	Lamp, dial; GE #47	39A004
	MISCELLANEOUS	
	Bandswitch and shaft	60B392
	Cabinet (lower section)	66E359
	Cabinet front panel	68D160
	Cabinet top	66D616
	Dial, bandspread	83B372
	Dial, main tuning	83C240
	Dial cord	38A001
	Foot, rubber	16A007
	Glass, bandspread tuning dial	22A307
	Glass, main tuning dial	22B199
	Knob, BAND SELECTOR	15A266
	Knob, PITCH CONTROL	15A058
	Knob, TUNING and BANDSPREAD	15A047
	Knob, SENSITIVITY, VOLUME and TONE	15A049
	Lock, line cord	76A397
	Screw, Allen head (6-32 x 3/16)	3A1122
	Slug, adjustable tuning	77A068
LS-1	Speaker, PM; 5 inch	85B050
	Spring, dial cord	75A012
	Spring, retainer	75A062
TS-1	Terminal strip, antenna	88A032



NOTES—

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND THE ELECTRICAL GROUND BUSS (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE—117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC"—NO CONNECTION. (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR"—NOT READABLE (READING GENERALLY MEANINGLESS).
8. [ ] SPACE PROVIDED FOR SERVICE METER READINGS.
9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT SAME POTENTIAL WITH THE CHASSIS GROUNDED.

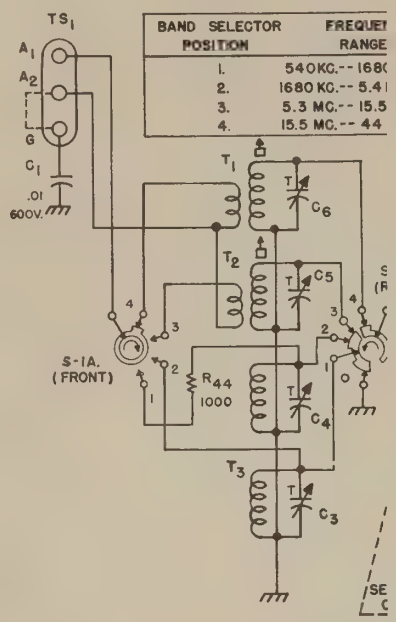
CONTROL	SETTING
SENSITIVITY	FULL CLOCKWISE
BAND SELECTOR	BAND 4
AVC	ON
CW/AM	AM
NOISE LIMITER	OFF
STANDBY/RECEIVE	RECEIVE

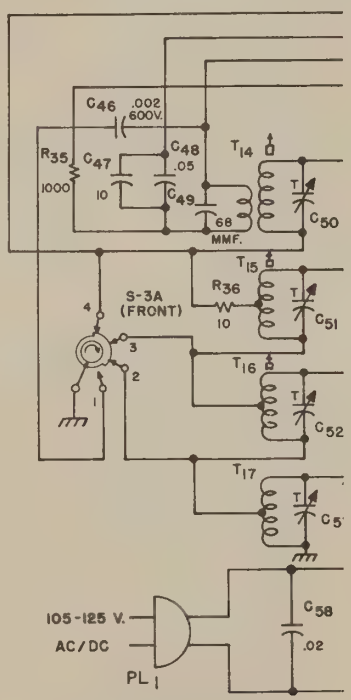
92D1309

FIG. 6. TUBE SOCKET VOLTAGE CHART

Errata Sheet No. 94X941
Use with Book No. 94X630

ERRATA SHEET & SCHEMATIC DIAGRAM FOR MODEL S-77A (RUN 4)





SWITCH S7B SHOWN IN POSITION 1. SWITCH IS CLOSED IN POSITION 2,3 & 4.

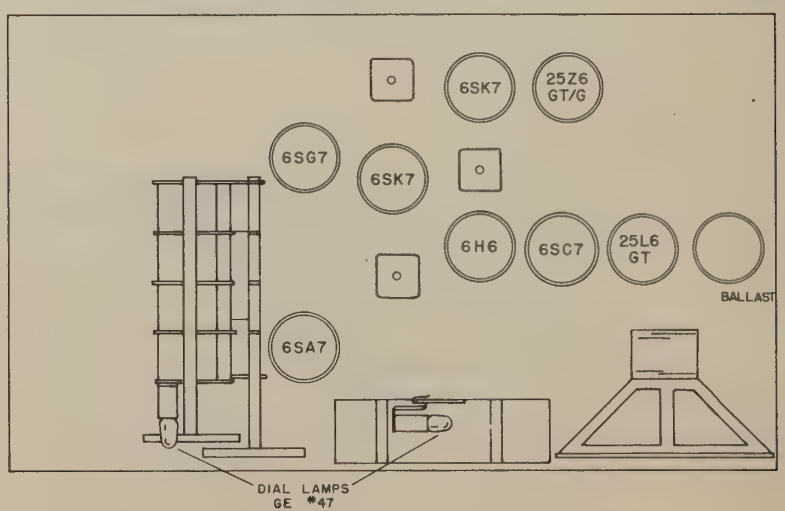
"The Hallicr
revisions in
no obligatio
models."

After printing the instruction book for Model S-77A, circuit improvements were made in the receiver which necessitated the printing of a new schematic diagram. The schematic in the instruction book should be removed and replaced with the Run 4 schematic.

SUPPLEMENTARY PARTS LIST

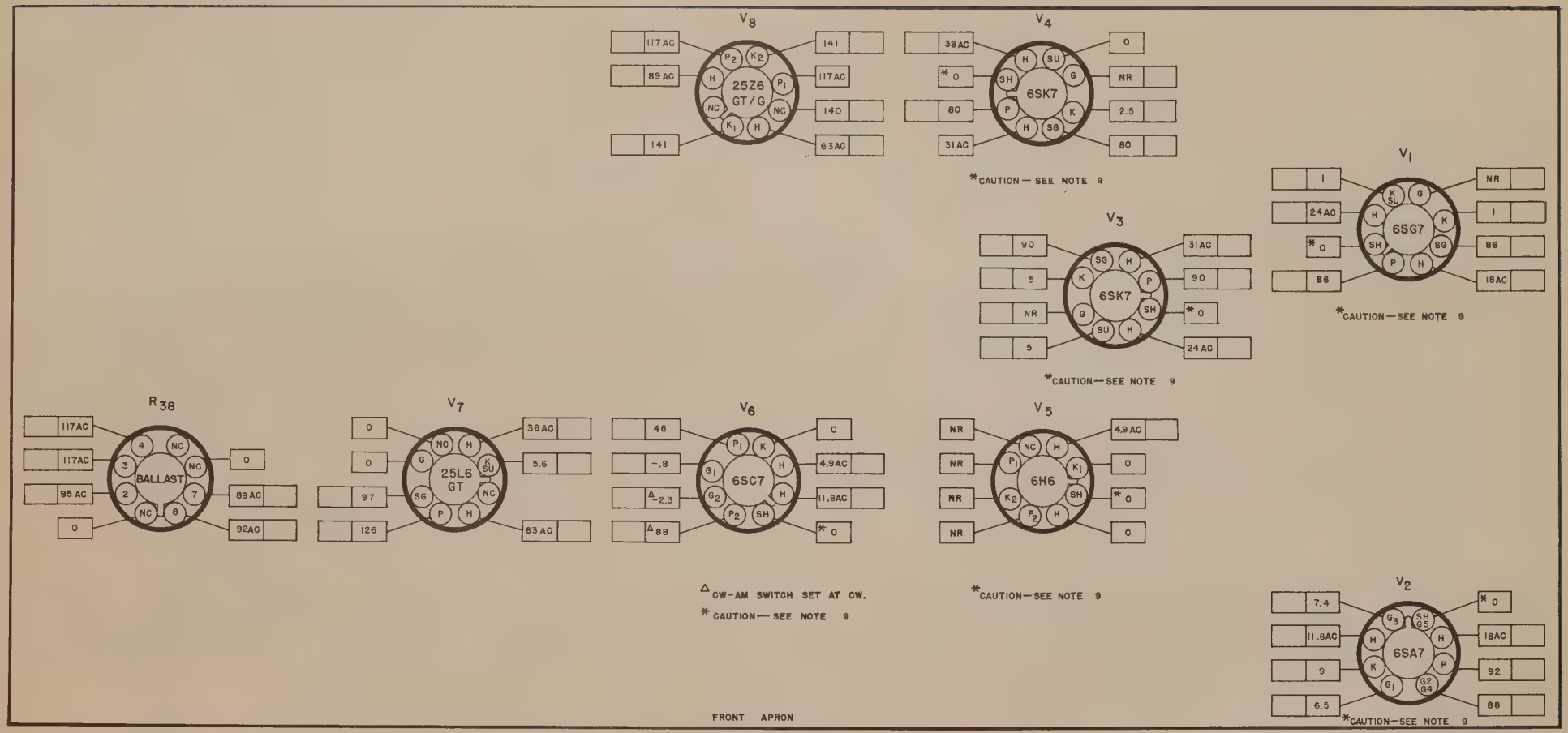
This parts list contains additions and corrections to the SERVICE PARTS LIST located on page 7 of the instruction book. When ordering parts, refer to the list below FIRST before referring to the SERVICE PARTS LIST.

Ref. No.	Description	Hallicrafters Part Number
	CAPACITORS	
C-59	.02 mfd. 600V., tubular paper	46AY203J
C-64	20,000 mmf. 500V., ceramic disc	47A242
	RESISTORS	
R-5,10,11, 14,18,35 44,46	1000 ohms 1/2 watt, carbon	23X20X102K
	SWITCHES	
S-4	Switch, toggle (SPDT); STANDBY-RECEIVE	60A139
S-5,6,8	Switch, toggle (SPST); AVC, NOISE LIMITER and CW-AM	60A138
	MISCELLANEOUS	
	Knob, TUNING and BANDSPREAD	15A048
	Cabinet (lower section)	66D652
	Dial cord (specify length)	38A026



9281304

FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS



BOTTOM VIEW OF CHASSIS

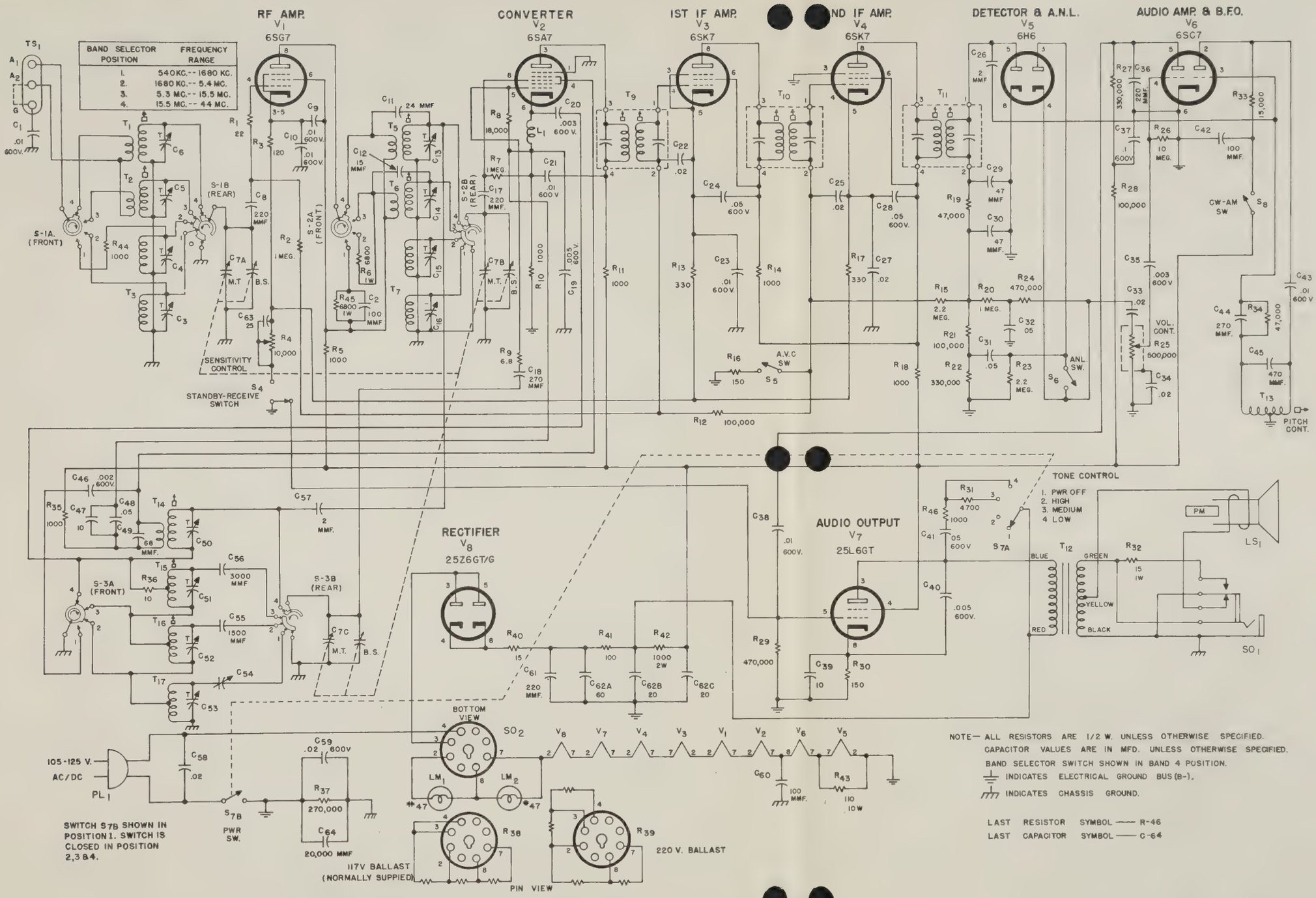
NOTES—

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND THE ELECTRICAL GROUND BUSS (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE—117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. "NC"—NO CONNECTION. (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
7. "NR"—NOT READABLE (READING GENERALLY MEANINGLESS).
8. [ ] SPACE PROVIDED FOR SERVICE METER READINGS.
9. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS AND CHASSIS ARE AT SAME POTENTIAL WITH THE CHASSIS GROUNDED.

CONTROL	SETTING
SENSITIVITY	FULL CLOCKWISE
BAND SELECTOR	BAND 4
AVC	ON
CW/AM	AM
NOISE LIMITER	OFF
STANDBY/RECEIVE	RECEIVE

92D1309

FIG. 6. TUBE SOCKET VOLTAGE CHART



NOTE— ALL RESISTORS ARE 1/2 W. UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE IN MFD. UNLESS OTHERWISE SPECIFIED.
BAND SELECTOR SWITCH SHOWN IN BAND 4 POSITION.
⏚ INDICATES ELECTRICAL GROUND BUS (B-).
⏚ INDICATES CHASSIS GROUND.

LAST RESISTOR SYMBOL —— R-46
LAST CAPACITOR SYMBOL —— C-64

89D358-C

"The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models."

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

FIG. 8. SCHEMATIC DIAGRAM

Errata Sheet No. 94X941
Use with Book No. 94X630

ERRATA SHEET & SCHEMATIC DIAGRAM FOR MODEL S-77A (RUN 4)

After printing the instruction book for Model S-77A, circuit improvements were made in the receiver which necessitated the printing of a new schematic diagram. The schematic in the instruction book should be removed and replaced with the Run 4 schematic.

SUPPLEMENTARY PARTS LIST

This parts list contains additions and corrections to the SERVICE PARTS LIST located on page 7 of the instruction book. When ordering parts, refer to the list below FIRST before referring to the SERVICE PARTS LIST.

Ref. No.	Description	Hallicrafters Part Number
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R-5,10,11, 14,18,35 44,46	1000 ohms 1/2 watt, carbon	23X20X102K
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S-5,6,8	Switch, toggle (SPST); AVC, NOISE LIMITER and CW-AM	60A138
	MISCELLANEOUS	
	Knob, TUNING and BANDSPREAD	15A048
	Cabinet (lower section)	66D652
	Dial cord (specify length)	38A026

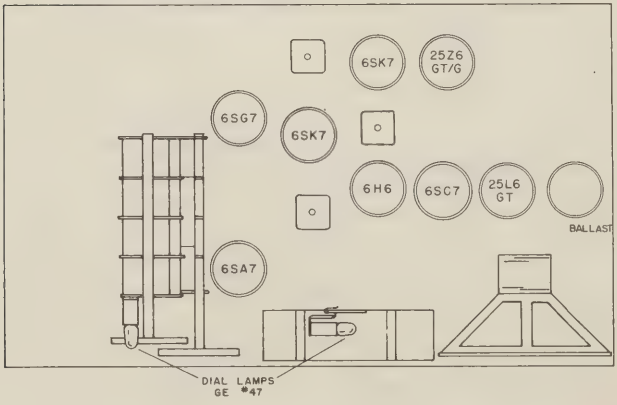
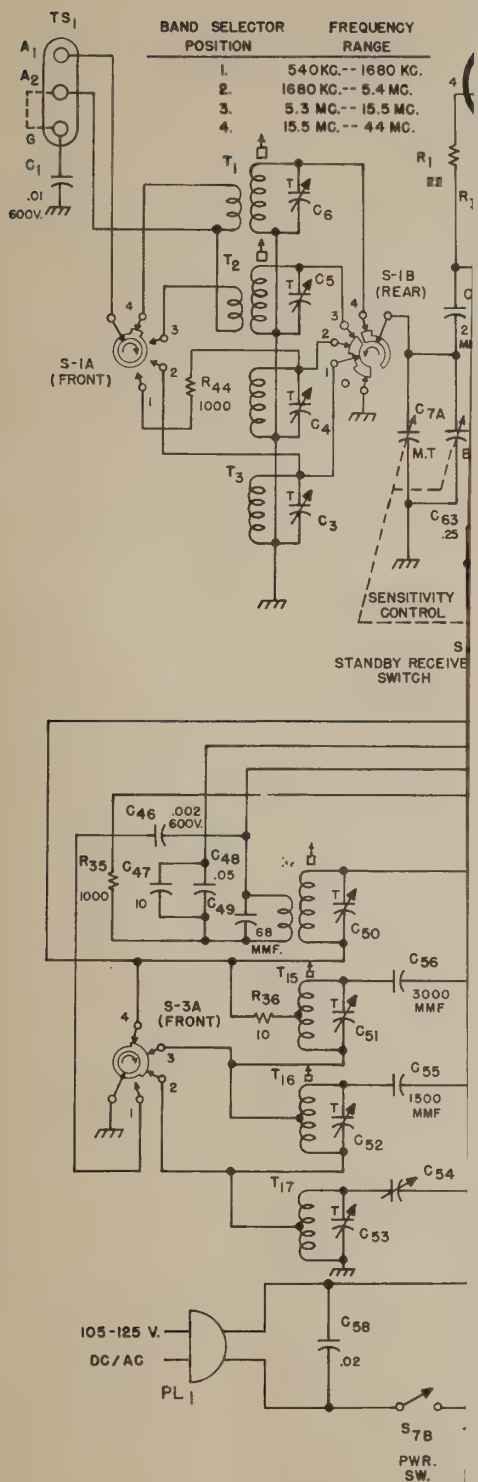


FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS



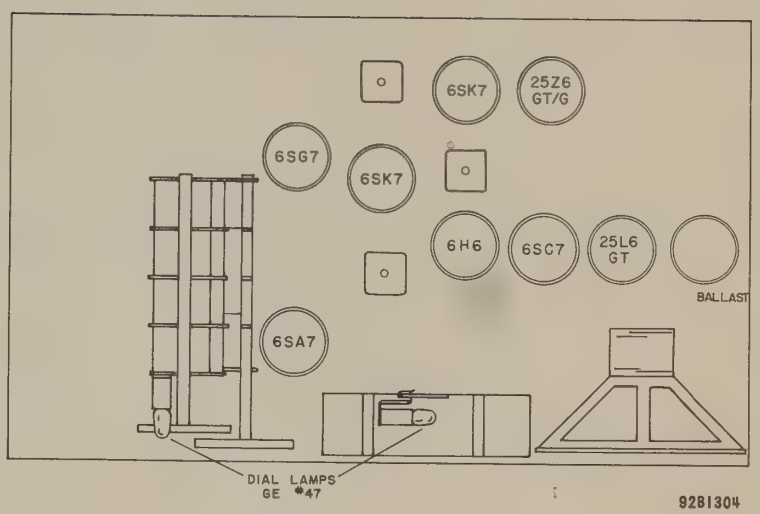
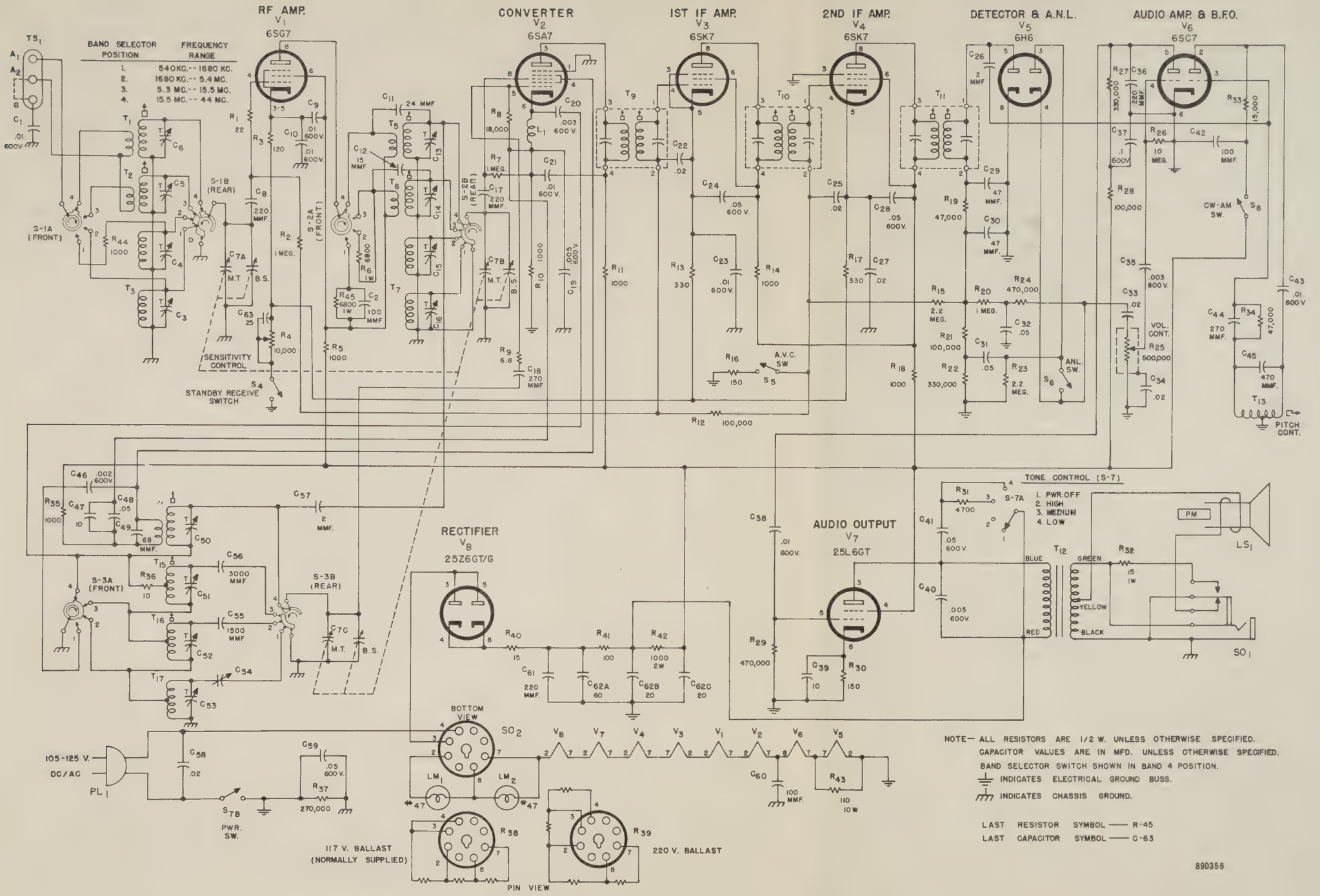


FIG. 7. TOP VIEW, LOCATION OF TUBES AND DIAL LAMPS

"The Hallicrafters Co. reserves
revisions in current production
no obligation to incorporate the
models."



NOTE— ALL RESISTORS ARE 1/2 W. UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE IN MFD. UNLESS OTHERWISE SPECIFIED.
BAND SELECTOR SWITCH SHOWN IN BAND 4 POSITION.
⏚ INDICATES ELECTRICAL GROUND BUSS.
⏚ INDICATES CHASSIS GROUND.

LAST RESISTOR SYMBOL — R-45
LAST CAPACITOR SYMBOL — C-63

890358

"The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models."

VALUES & TOLERENCES SHOWN ARE NOMINAL A VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

FIG. 8. SCHEMATIC DIAGRAM

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

94X630
1150

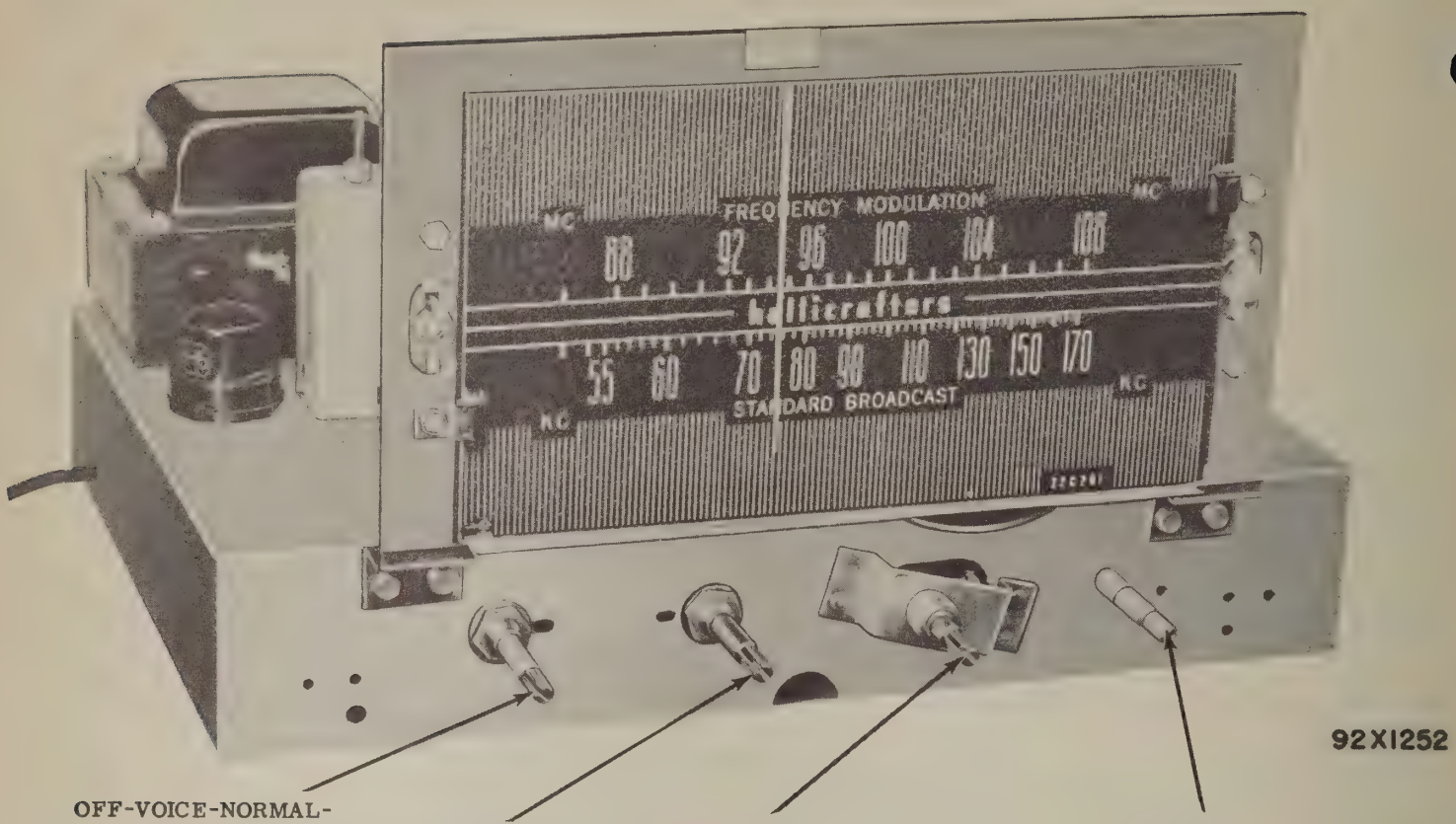
communications

OPERATING and SERVICE INSTRUCTIONS

S-78

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

USE OF OPERATING CONTROLS



OFF-VOICE-NORMAL-BASS-HI-FI

This is a combination power switch and tone control. In position one the receiver is completely turned off. To turn the receiver on, set this control at any of the four remaining positions, depending upon the tone qualities desired. Illumination of the dial indicates that the receiver is obtaining power from the wall outlet and ready for use. The tone control settings generally used are VOICE and NORMAL for speech and BASS and HI FI for musical entertainment.

VOLUME

Turn this control clockwise to increase volume and counter clockwise to decrease volume.

FM-BROADCAST-PHONO

This is the combination range and operation switch. In the FM (Frequency Modulation) position, the receiver tunes the 88 to 108 megacycle FM band; and in the BROADCAST position, the receiver operates as a standard broadcast receiver tuning the frequency range 540 to 1750 kilocycles. To use the receiver as a record player, set this switch at PHO and operate the volume and tone controls as for normal radio reception.

TUNING

The tuning control "tunes in" either BC or FM stations depending upon the setting of the range switch. The standard broadcast band dial is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles. The frequencies of the FM stations are shown directly in megacycles. The frequencies of local stations are generally listed in local newspapers, BC stations in kilocycles and FM stations in megacycles. When tuning for the station, tune carefully and obtain top performance from your receiver.

GENERAL SPECIFICATIONS

Mounting details illustrated on page 10.

Tubes	Ten plus rectifier
Speaker Output	3.2 and 500 ohms.
Speaker Connection	Std. 5 pin socket.
Antenna	Provisions for external antennas
Tuning	Manual
Tuning Range	Broadcast 540 kc - 1750 kc Frequency Modulation 88 mc - 108 mc
Intermediate Frequency	455 kc/10.7 mc.
Power Supply	105-125 V. 50/60 cycles AC
Power Consumption	90 Watts

INSTALLATION

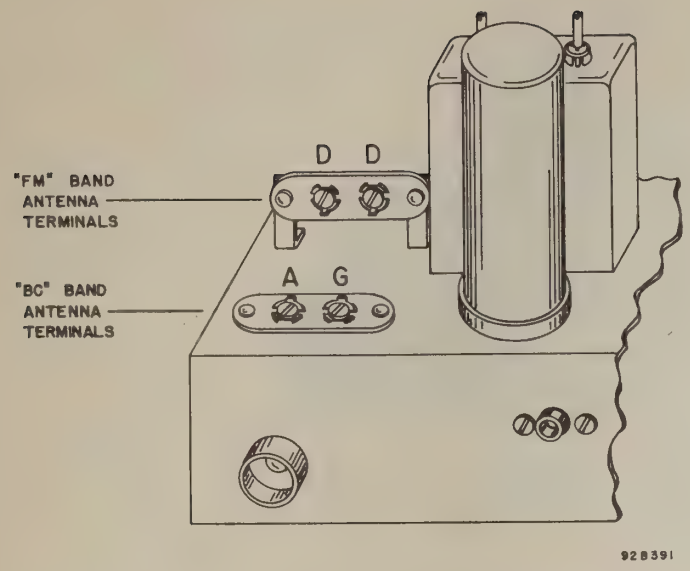


Fig. 2. Antenna terminal strip connections

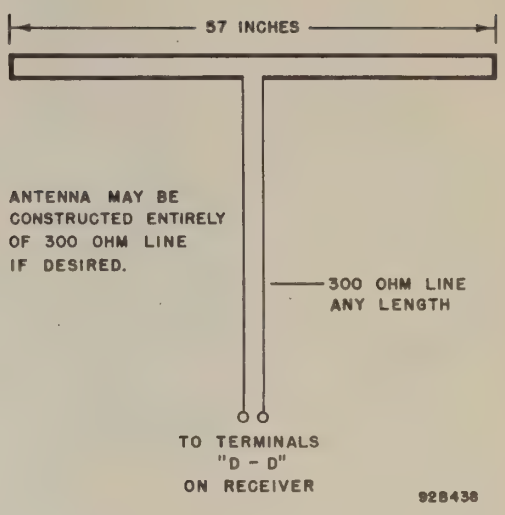


Fig. 3. Folded doublet antenna details.

When locating the receiver, avoid excessively warm locations such as are found near radiators or hot air registers. When placing the receiver with its back to the wall, leave about an inch or two of clearance between the back of the cabinet and the wall for proper ventilation.

There are three basic connections to be made, antenna, speaker, and power, to completely set up the receiver. All connections are located on the rear apron of the chassis.

ANTENNA - Terminals are provided for separate AM broadcast (BC) and FM broadcast (FM) antennas. The BC band antenna terminals are marked "A" and "G" and the FM band antenna terminals are identified by "D-D".

BC Antenna - The standard broadcast band antenna may consist of any single length of wire from approximately ten feet to fifty feet depending upon the local receiving conditions. Attach the wire to the "A" terminal of the antenna terminal strip. Erect outdoor antenna installations as high and as free from surrounding objects as possible. Erecting this type of antenna at right angles to local "man made" sources of static, (street car lines, power lines, etc.) is recommended for best results. An excessively long antenna will not necessarily be the most desirable antenna. Use the length that will provide adequate signal pick up.

For some installations it will be found desirable to connect a ground wire to the "G" terminal of the terminal strip. A radiator or water pipe will generally serve as a good ground connection.

FM Antenna - The antenna for FM reception may consist of any type of antenna that operates with a 300-ohm transmission line. If a commercial antenna is installed, be sure it uses a 300-ohm transmission line. The transmission line from the antenna is connected to terminals "D-D" on the receiver.

The simplest antenna which will provide satisfactory results, mounted either on the back of a console cabinet or outside the building, is the folded doublet. This antenna may be constructed from 300-ohm transmission line as shown in Fig. 3. Keep in mind that the doublet antenna response favors signals broadside to its length and should be erected with its length at right angles to the direction of reception. This is especially important where receiving conditions are poor and maximum antenna pickup is required.

POWER SOURCE - The receiver operates from a 105-125 V. 60 cycle AC source only. The receiver will not operate from a 115 V. direct current source or 25 cycle AC source directly. If in doubt as to the voltage and frequency rating of your power source, contact the local power company representative and avoid costly repairs. The nominal power consumption for this receiver is 90 watts.

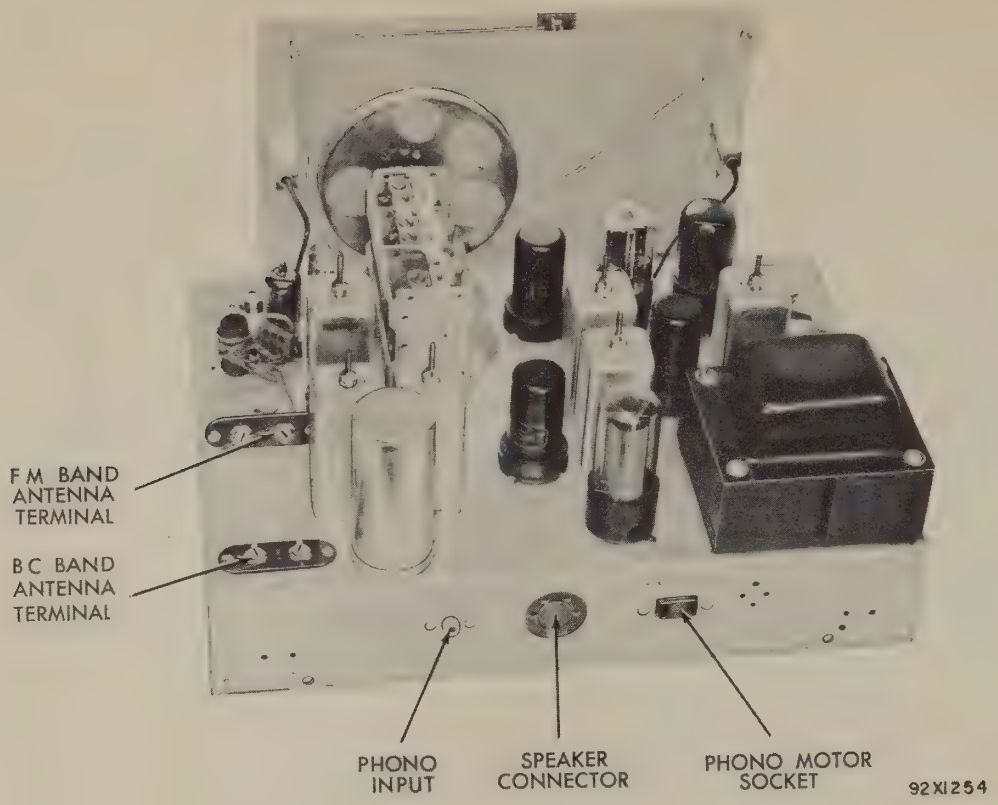


Fig. 4. Component location, rear view

SPEAKER CONNECTIONS

The speaker connector is located on the rear apron of the receiver. Connection is to be made through a standard 5 pin tube socket. The receiver is designed to operate into either a 3.2 ohm or a 500 ohm speaker load. For detailed information on making connections for either load refer to the schematic diagram. If a matching transformer is used in connection with the speaker load it should be capable of handling approximately 10 watts of audio power.

RECORD PLAYER CONNECTION

A shielded type receptacle is provided at the rear chassis apron to accommodate a record player pickup cable connector. Any record player employing a crystal cartridge or high level magnetic pickup in its tone arm may be used with the receiver. A utility receptacle is provided at the rear apron of the receiver to accommodate the power plug of the record player. The use of this receptacle will permit the record player to be turned off with the receiver.

TUBE REPLACEMENT

The types of tubes required and their relative position in the receiver are shown in the illustration, Fig. 6. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; and push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing into place. Handle with care as all tubes are considered fragile and do not tolerate much mechanical abuse.

DIAL LAMP REPLACEMENT

Refer to Fig. 6 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, unclip the dial lamp socket by compressing the side springs. The socket may then be brought out into the open to change the defective lamp.

SERVICE OR OPERATING QUESTIONS

For further details regarding operation or servicing of the receiver, contact your dealer directly. Make no service shipments directly to the factory before first writing for authorization and instructions. The factory cannot accept responsibility for unauthorized shipments.

RESTRINGING DIAL CORD

Restring the dial drive with 30 lb. test dial cord. Tie one end to the tension spring and follow the sequence outlined in Fig. 5. Stretch the tension spring and tie the end of the cord securely to the spring as shown.

Set the tuning condenser at maximum capacity (closed), attach the pointer to the string and line it up with the left hand index mark on the dial scale.

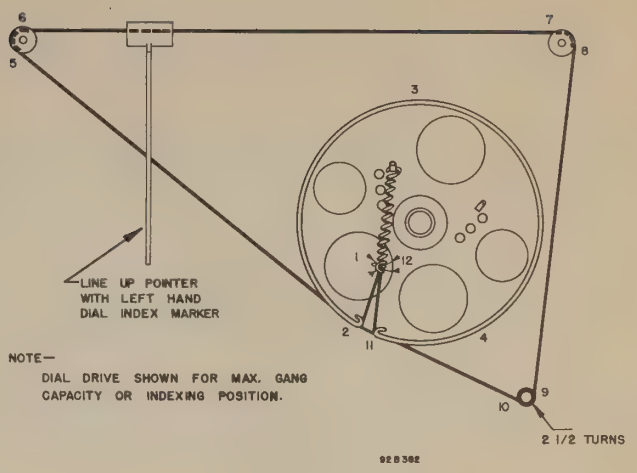


Fig. 5. Dial cable stringing procedure.

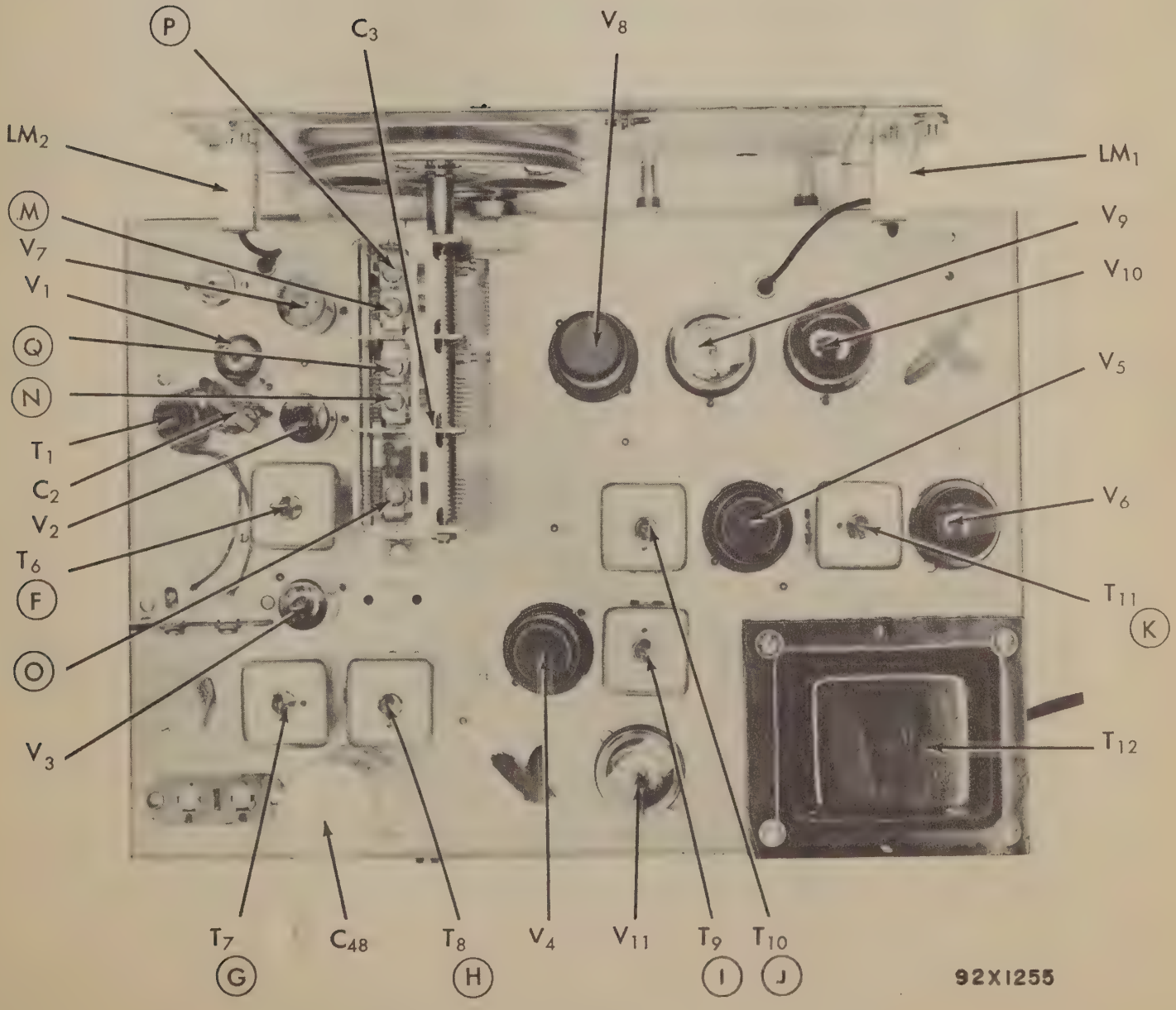


Fig. 6. Top view alignment points & component locations

ALIGNMENT PROCEDURE

The receiver is equipped with AUTOMATIC FREQUENCY CONTROL on the FM band to compensate for oscillator drift and improve the tuning function on the FM band. The correction factor is approximately 5 times: AFC takes hold 250 kc before the station frequency is reached and releases before tuning 500 kc beyond the station frequency when receiving a 1000 microvolt signal.

The standard RMA dummy specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

When making the alignment adjustments set the tone control at NORMAL and the volume control at maximum volume. Use just enough signal generator output to obtain the results indicated on the chart.

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Pos.	Radio Dial Setting	Adjust	Remarks
1	0.01 mfd. cap	To high cap. stator of center section.	455 kc	"BC"	1000 kc	A,B,C,D, E	Adjust for max. audio output. Keep audio output below 500 MW to avoid AVC action.
2	0.01 mfd. cap. in series with a 4700 ohm carbon resistor.	To low cap. stator of center section.	10.7 mc	"FM"	90 mc	F,G,H,I, J,K	Adjust for max. voltage as measured between pin #3 of 6H6 and ground with an electronic volt meter. Adjust signal generator output for approx. 2 volts DC at this point.
3	0.01 mfd cap.	See step 2.	10.7 mc	"FM"	90 mc	L	Adjust for zero voltage as measured between the junction of R27 and R28 and ground with an electronic volt meter.
4.	Std RMA dummy	To terminals "A" and "G" on terminal strip TS-2.	1500 kc	"BC"	1500 kc	*M,N,O	Adjust for max. output as in step 1.
5.	Two 150 ohm carbon resistors	To terminals "D-D" on terminal strip TS-1.	105 mc	"FM"	105 MC	*P,Q	Adjust for max. voltage as measured across R54 with an electronic volt meter. Adjust signal generator output for approx. 1 volt DC at this point.

*NOTE - Calibration adjustments.

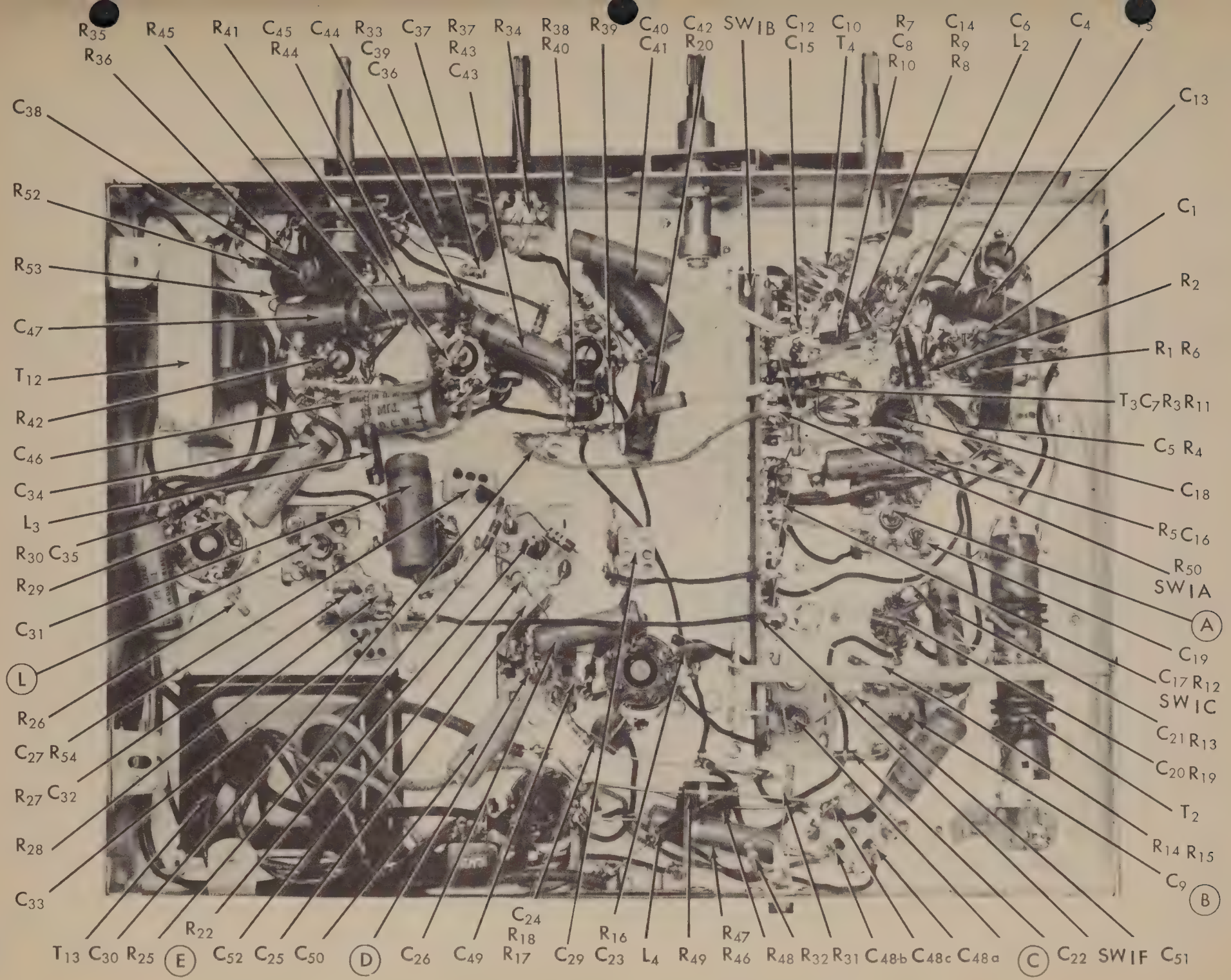


Fig. 7. Bottom view alignment points & component locations

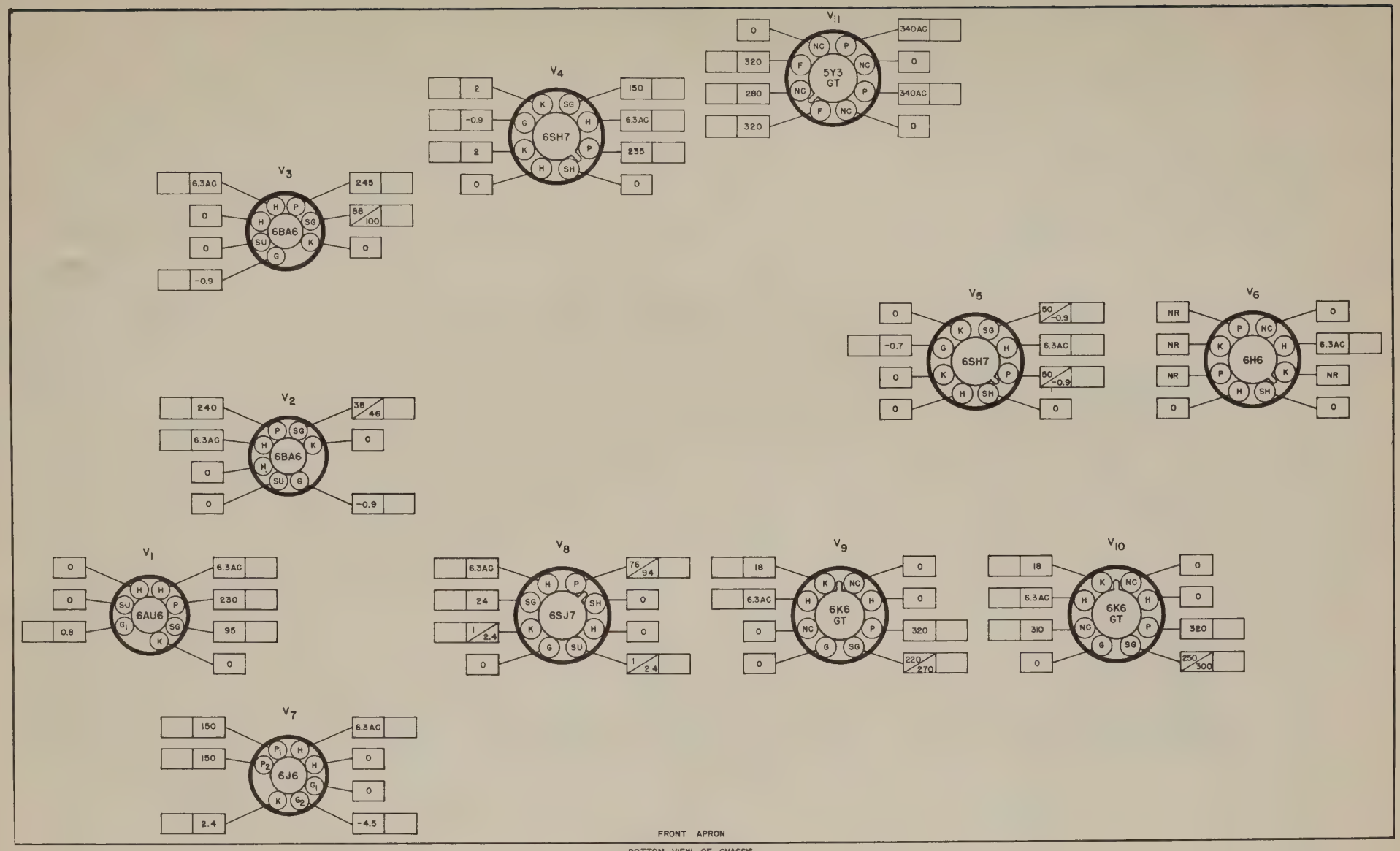
92X1253

SERVICE PARTS LIST

Ref. No.	Description	Hallicrafter's Part Number
	CONDENSERS	
C-1,7,15,19	100 mmf. 500 V., ceramic	47B20101M5
C-2	100 mmf. 500 V., mica	CM20A101M
C-3	Tuning condenser, 5 sections	48C196
C-4,5,14,17, 18,20,23,24	.005 mfd. 450 V., ceramic	47A168
C-6	33 mmf. 500 V., ceramic	CC20UK330K
C-8	3.3 mmf. 500 V., bakelite	47A160-5
C-9,34,35	.05 mfd. 200 V., tubular paper	46AU503J
C-10,12	47 mmf. 500 V., ceramic	CC20UK470M
C-11	7 mmf. 500 V., ceramic	CC20UK070K
C-13,21,26, 36,43,45	.01 mfd. 600 V., tubular paper	46AZ103F
C-16	.02 mfd. 200 V., tubular paper	46AU203J
C-22	4.7 mmf. 500 V., bakelite	47A160-6
C-25	12 mmf. 500 V., mica	CM20A120K
C-27	47mmf. 500 V., mica	CM20A470M
C-29,32, 33	150 mmf. 500 V., mica	CM20A151M
C-30,37,49	1000 mmf. 500 V., ceramic	47B20102M5
C-31,41	.05 mfd. 600 V., tubular paper	46AY503J
C-38	.03 mfd. 200 V., tubular paper	46AU303J
C-39	68 mmf. 500 V., mica	CM20A680M
C-40	.003 mfd. 600 V., tubular paper	46AZ302J
C-42	.005 mfd. 600 V., tubular paper	46AZ502J
C-44	220 mmf. 500 V., mica	CM20A221M
C-46	10 mfd. 25 V., electrolytic	45A121
C-47	.002 mfd. 600 V., tubular paper	46AZ202J
C-48	60-20-20 mfd. 450 V., electrolytic	45B113
C-50	.01 mfd 600 V., molded paper	46AG103J
C-51,52	1 mmf. 500 V., bakelite	47A160-2
	RESISTORS	
R-1,13	1 megohm ½ watt, carbon	RC20AE105M
R-2,14,17, 27,28	47,000 ohms ½ watt, carbon	RC20AE473M
R-3,5,26,31	220,000 ohms ½ watt, carbon	RC20AE224M
R-4,15	470 ohms ½ watt, carbon	RC20AE471M
R-6	4700 ohms 2 watts, carbon	RC40AE472M
R-7	10 ohms ½ watt, carbon	RC20AE100M
R-8,25	22,000 ohms ½ watt, carbon	RC20AE223M
R-9	150 ohms ½ watt, carbon	RC20AE151M
R-10	220 ohms ½ watt, carbon	RC20AE221M
R-11,33,54	100,000 ohms ½ watt, carbon	RC20AE104M
R-12,32,40, 41,42	470,000 ohms ½ watt, carbon	RC20AE474M
R-16	270 ohms ½ watt, carbon	RC20AE271K
R-18,53	1000 ohms ½ watt, carbon	RC20AE102M
R-19,39	2.2 megohms ½ watt, carbon	RC20AE225M
R-20	68,000 ohms ½ watt, carbon	RC20AE683M
R-22	330,000 ohms ½ watt, carbon	RC20AE334M
R-29,30	100,000 ohms ½ watt, carbon	RC20AE104K
R-34	Volume control, 2 megohms (tapped)	25B623
R-35,36, 44,50	6800 ohms ½ watt, carbon	RC20AE682M
R-37	330 ohms ½ watt, carbon	RC20AE331K
R-38	100,000 ohms 1 watt, carbon	RC30AE104K
R-43	300 ohms 2 watt, carbon	RC40AE301J
R-45	12,000 ohms ½ watt, carbon	RC20AE123K
R-46,47	1200 ohms 2 watt, carbon	RC40AE122K
R-48,49	1500 ohms 2 watt, carbon	RC40AE152K
R-52	15,000 ohms 1/2 watt carbon	RC20AE153K
	TRANSFORMERS AND COILS	
T-1	Transformer, FM, antenna stage	51B1021
T-2	Transformer, BC, mixer stage	51B1059
T-3	Transformer, FM, mixer stage	51B1022
T-4	Transformer, FM, osc. stage	51B1073
T-5	Transformer, BC, osc. stage	51B1020
T-6	Transformer, 1st I.F.	50B409
T-7,9	Transformer, 2nd I.F. and AM Detector & FM limiter	50B407

SERVICE PARTS LIST (Cont.)

Ref. No.	Description	Hallicrafter's Part Number
	TRANSFORMERS AND COILS (Cont.)	
T-8,10	Transformer, 2nd I.F. and AM Detector & FM limiter	50B408
T-11	Transformer, FM, detector stage	50B410
T-12	Transformer, audio output	55B158
T-13	Transformer, power	52C152
L-2	Plate choke for tube V1	53B124
L-3	Filament choke for tubes V5 & 6	53B123
L-4	Filament choke for tubes V1,2,3, & 7	53A136
	SWITCHES	
SW-1	Band switch assembly	60B318
SW-2	Switch, tone control	60B319
	PLUGS AND SOCKETS	
PL-1	Line cord and plug	87A078
SO-2	Receptacle, television, phono	36A029
SO-3	Receptacle, speaker	6A277
SO-4	Receptacle, phono motor	10A015
	Socket, octal (tube)	6A296
	Socket, miniature (tube)	6A297
	Socket & bracket, dial light	86A062
	TUBES, RECTIFIERS AND LAMPS	
V-1	6AU6 antenna	90X6AU6
V-2,3	6BA6 mixer, 1st I.F.	90X6BA6
V-4,5	6SH7 2nd I.F., limiter	90X6SH7
V-6	6H6 discriminator	90X6H6
V-7	6J6 osc. & AFC	90X6J6
V-8	6SJ7 audio amp.	90X6SJ7
V-9,10	6K6GT power amp.	90X6K6GT
V-11	5Y3GT rectifier	90X5Y3GT
LM-1,2	Lamp, 6-8 V., 250 Ma., Mazda #44	39A003
	MISCELLANEOUS	
	Shaft, tuning	74A247
	Pulley, idler	28A052-6
	Switch, cam	77A261
	Drive pin	74A246
	Collar	77A267
	Bushing	77A266
	Bracket, dial plate mtg.	67A793
	Dial plate	63B332
	Dial background (paper)	32A446
	Dial glass (calibrated)	22C201
	Clip (for dial glass 22C201)	76A390
	Rubber spacer, for dial clip	16A126
	Pointer	82A147
	Dial cord	38A019
	Spring, dial cord	75A012
	Dial glass (clear)	22B205
	Clip (for dial glass 22B205)	76A331
	Escutcheon (Model S-55)	7C067-1
	Escutcheon (Model S-56)	7C067
	Knob, tone and range controls (Model S-55)	15B077-4
	Knob, tone and range controls (Model S-56)	15B068-3
	Knob, tuning and volume controls (Model S-55)	15B068-4
	Knob, tuning and volume controls (Model S-56)	15B077-3
TS-1	Terminal strip, antenna (Marked D-D)	87A379
TS-2	Terminal strip, antenna (Marked A-G)	88A327
	Line cord lock	76A299
	Mounting foot, rubber	16A007



FRONT APRON

BOTTOM VIEW OF CHASSIS

NOTES—

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS.
3. LINE VOLTAGE—117 V. AC.
4. ALL VOLTAGES SHOWN WERE MEASURED WITH A 20,000 OHM/VOLTMETER AND AT ZERO SIGNAL.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED.
6. "NC"—NO CONNECTION.
7. [ ] THE BLANK SPACES ARE PROVIDED FOR THE SERVICEMAN. FILL IN THE ACTUAL READING AS TAKEN WITH YOUR OWN EQUIPMENT. A NORMAL OPERATING RADIO SHOULD BE USED FOR THESE MEASUREMENTS.
8. [FM/AM] WHERE TUBE SOCKET VOLTAGES CHANGE FROM FM TO AM RECEPTION TWO READINGS ARE SHOWN, UPPER LEFT SHOWS FM READINGS—LOWER RIGHT SHOWS AM READINGS.
9. "NR"—NOT READABLE.

92D1257

Fig. 8. Tube socket voltage chart

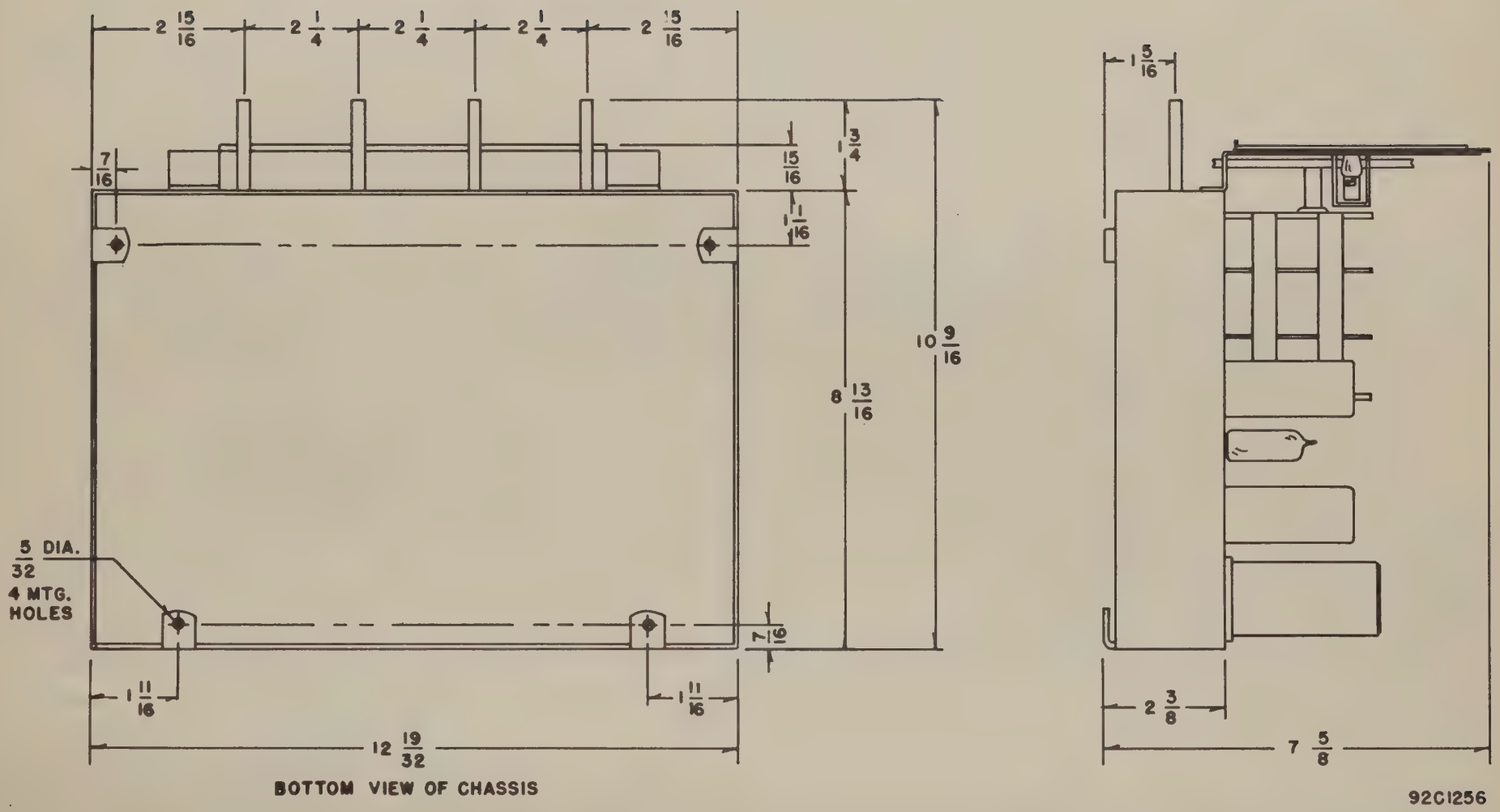


Fig. 9. Mounting dimensions.

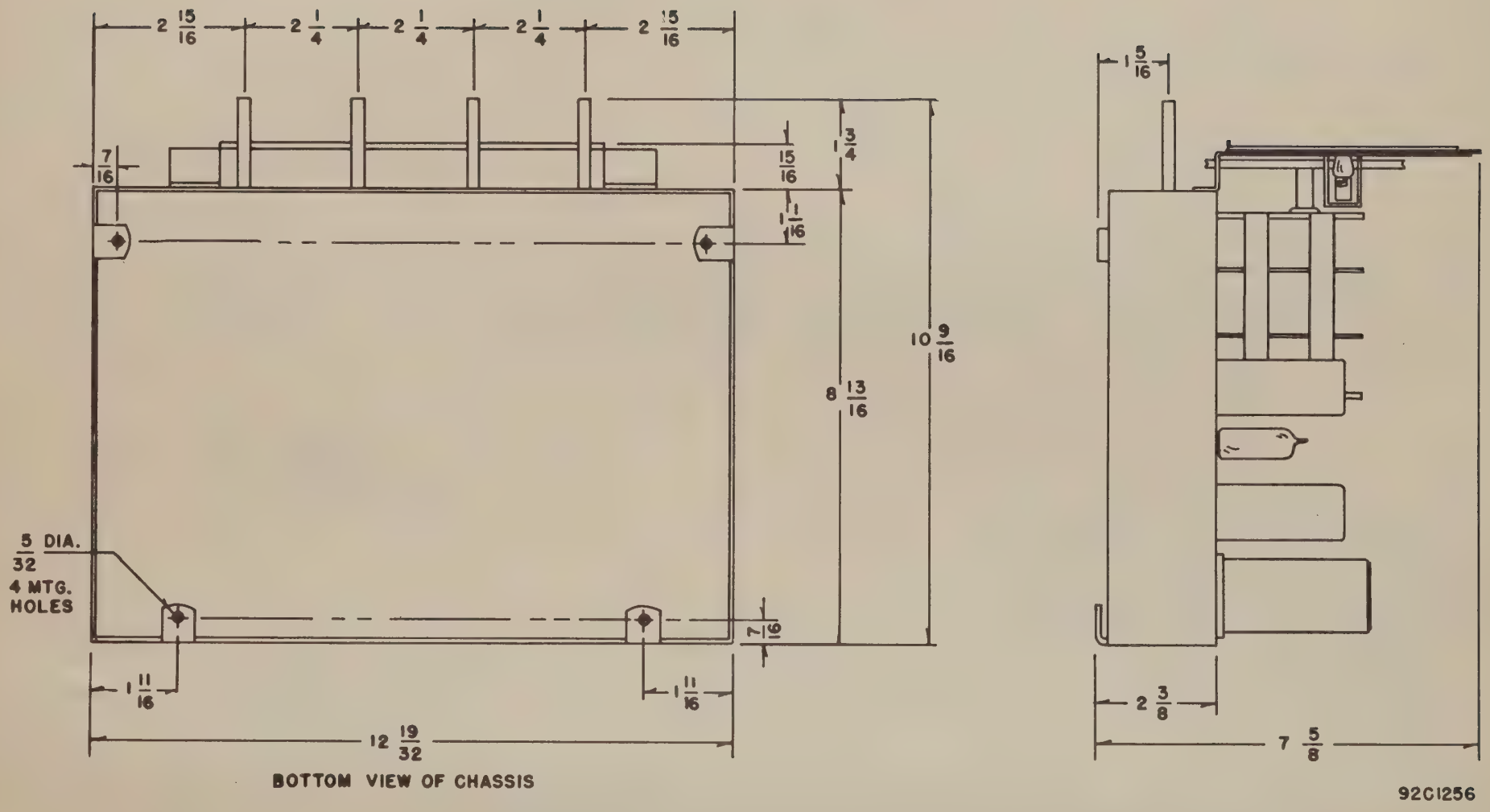


Fig. 9. Mounting dimensions.

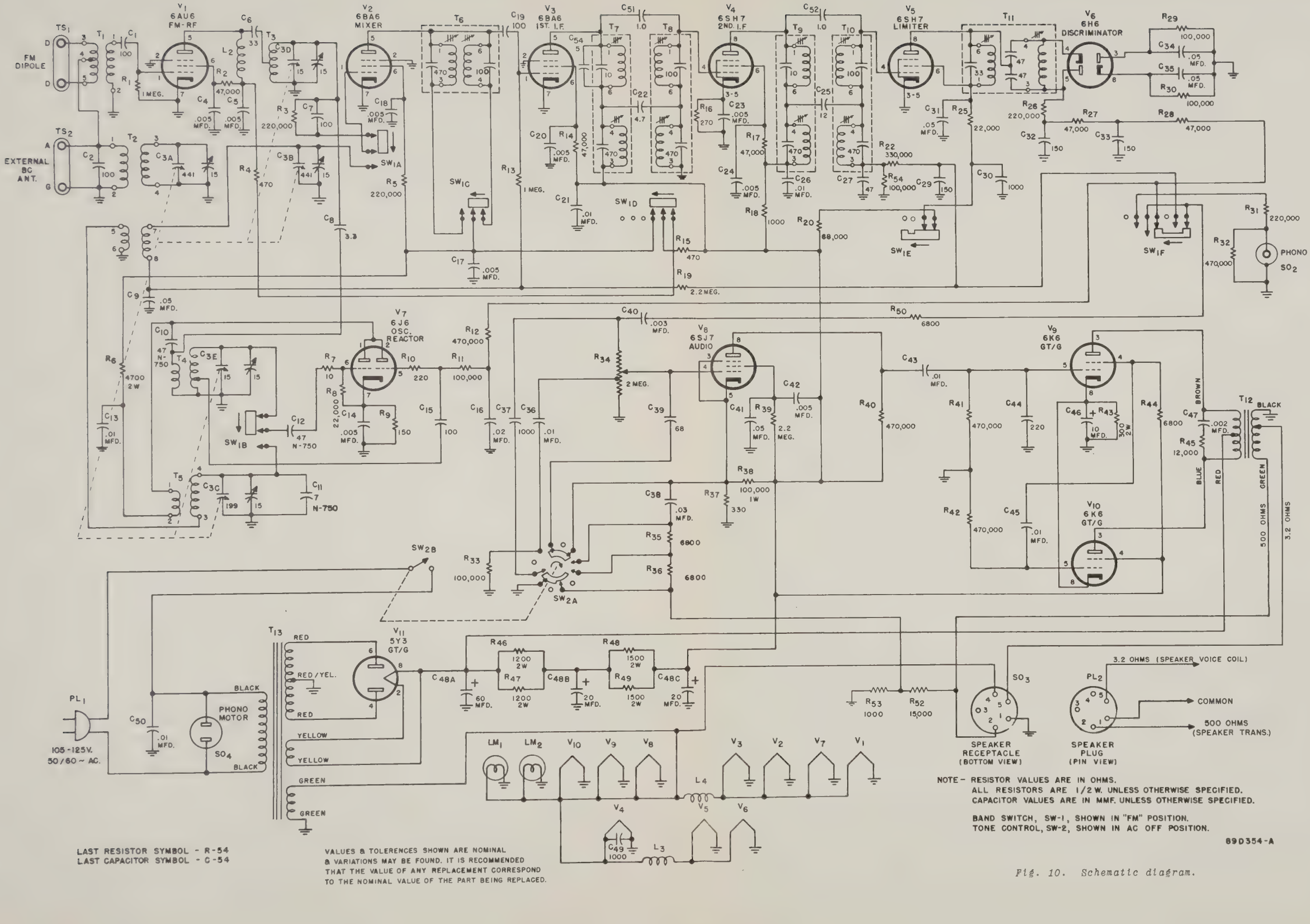


Fig. 10. Schematic diagram.

SERVICEMEN: USE THE SPACE BELOW TO MAKE SPECIAL NOTES FOR FUTURE REFERENCE IN SERVICING THIS EQUIPMENT.

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

94X615
950

Form No. 94X622

communications

OPERATING and SERVICE INSTRUCTIONS

S-78A
RUN 1

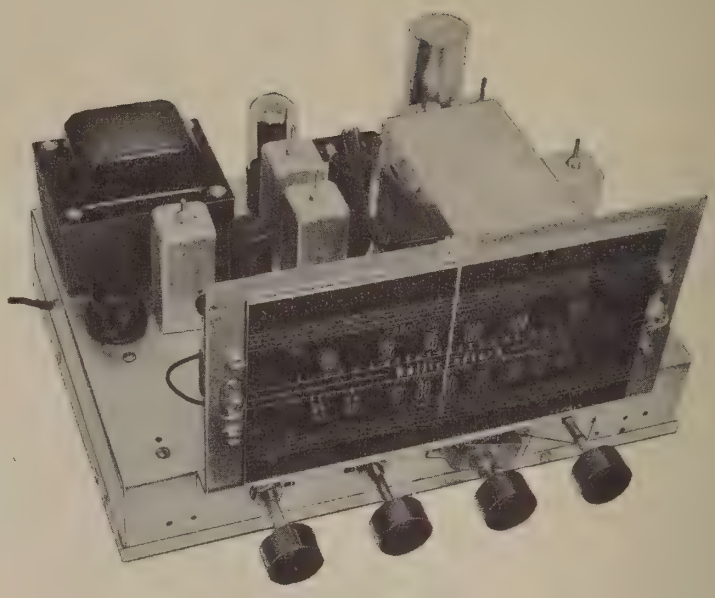
the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

Your Hallicrafters Model S-78A offers you standard broadcast and FM reception at its finest. It is an 11 tube FM/AM radio chassis specially designed for use in custom installations and operates from 105 to 125 volt 50/60 cycle alternating current (AC). A template and instructions for mounting the chassis are provided on a separate sheet included with your receiver.

The S-78A chassis should be used in conjunction with a quality speaker for really top performance. Terminals for connecting the speaker are on the back of the chassis. The push-pull output of the receiver delivers a full 7 watts of audio output which is more than adequate for an average home. Full tone quality is assured by a multi-position tone control which provides four different types of response: VOICE, NORMAL, BASS and HI-FI. For record player operation, a phono socket and an AC outlet for a phono motor are provided on the back of the chassis.

The receiver features automatic frequency control (AFC) on the FM band for easy tuning and drift-free reception. As an FM station is approached, the AFC circuit electronically "takes over" and holds the station in perfect tune.



92X1622

Hallicrafters Model S-78A

Four antenna terminals are provided on the back of the chassis for antenna connections - two for AM and two for FM. Good results can be obtained in most localities with a folded dipole antenna with a 300-ohm line lead-in for the FM range and a single wire 10 to 50 feet long for the broadcast range.

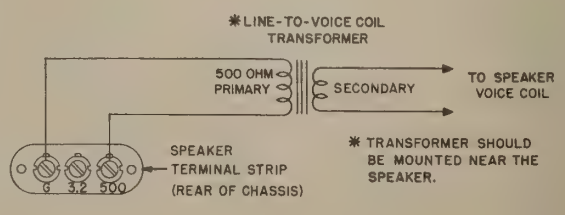
Radiation from many ordinary FM receivers has been found to interfere with the frequencies used for aircraft navigation. As a result, the F.C.C. may set up standards compelling radio manufacturers to keep radiation at a safe level. To meet the stringent standards proposed by the F.C.C., your receiver has been extensively shielded to minimize all possible radiation from the receiver.

The information which follows will assure you greater enjoyment of your Hallicrafters radio. Read it carefully before operating the receiver.

INSTALLATION INSTRUCTIONS

POWER SOURCE - This receiver is designed to operate from 105 to 125 volt 50/60 cycle alternating current (AC). If in doubt about your power supply, call your power company before plugging in the power cord. The wrong power source may cause damage to the receiver. The power consumption of the receiver is 90 watts.

SPEAKER CONNECTION - The terminals marked 3.2, 500 and G on the back of the chassis are for connections to an external speaker. If the speaker employed has a 3.2 ohm voice coil, connect it directly to terminals 3.2 and G. If it has other than a 3.2 ohm voice coil or if it is located remotely from the receiver, a line-to-voice coil transformer will be required. Details for connecting the transformer are shown in Fig. 1. The line-to-voice coil transformer should be capable of handling 10 watts of audio and should have a 500-ohm primary impedance and a secondary impedance to match the voice coil of the speaker.



92B1619

Fig. 1. Line-to-Voice Coil Transformer Connections

(Refer to text at left side of page)

ANTENNAS - Separate external antennas are required for broadcast and FM reception. Four terminals have been provided on the chassis for the antenna connections. (See Fig. 4.) The terminals marked A-G are for the broadcast antenna and those marked D-D are for an FM dipole antenna.

BC ANTENNA - For reception of the broadcast range, use a single wire 10 to 50 feet long depending upon local receiving conditions. Connect the wire to terminal A on the back of the chassis and run it about the room in a convenient manner. In some locations, reception may be improved by connecting a lead from terminal G to a cold water pipe or other good ground. If improved pickup is desired on the broadcast band, the antenna may be erected outdoors. An outside antenna should be erected as high as possible and at right angles to power lines for best results.

FM ANTENNA - A commercial FM dipole antenna with a 300-ohm line lead-in is recommended for optimum FM reception; however, good results can be obtained in most localities with the dipole antenna shown in Fig. 2. This antenna may be easily constructed from 300-ohm transmission line and mounted indoors on the back of a console cabinet, window frame, etc. or outdoors if desired. The positioning of the FM antenna is important. For maximum signal pickup, the antenna should be erected as high as possible and with its length at right angles to the direction of reception. A 300-ohm line lead-in should be used with the antenna. At the receiver, connect the lead-in to terminals D-D on the top of the chassis.

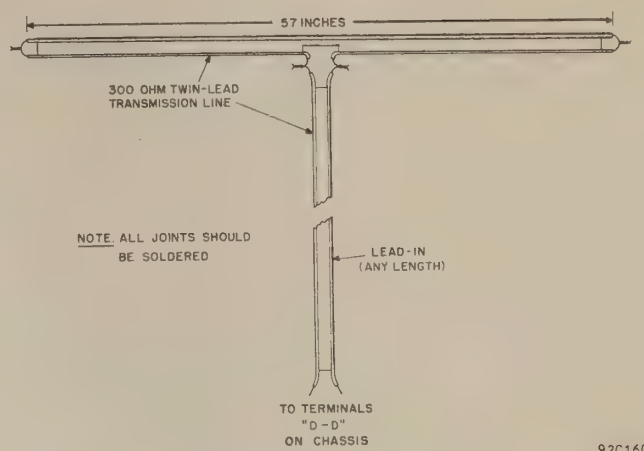


Fig. 2. Constructions Details for the FM Dipole Antenna

RECORD PLAYER CONNECTION - A phono socket is provided on the back of the chassis (see Fig. 4) to accommodate a record player using either a crystal cartridge pickup or a magnetic pickup with a suitable preamplifier. Connect the record player as shown in Fig. 3. Insert the power cord from the record player into the AC outlet on the back of the chassis (see Fig. 4). This will permit the record player to be turned on and off with the receiver on-off control.

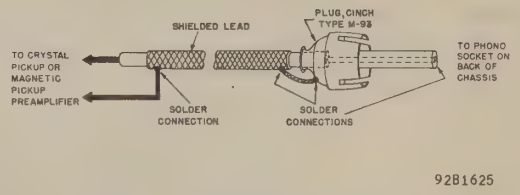


Fig. 3. Record Player Connection

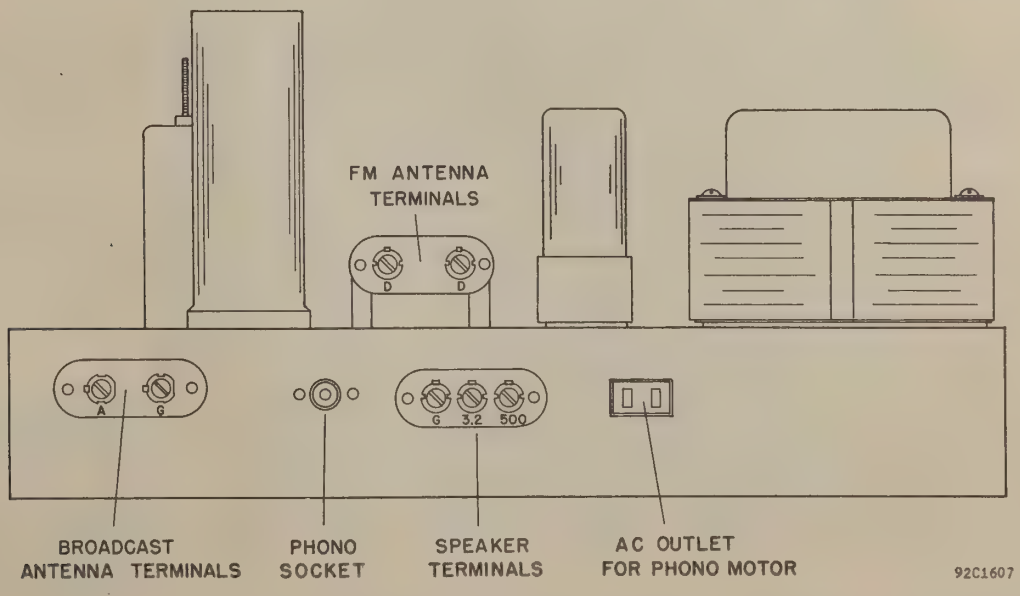
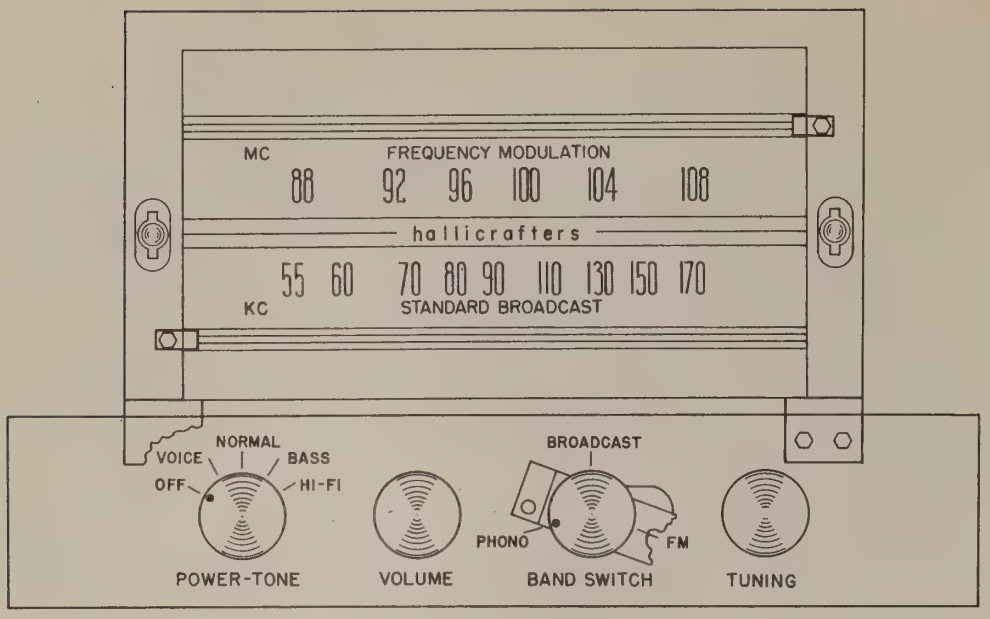


Fig. 4. Rear View of Chassis



OPERATING INSTRUCTIONS

DIAL - The dial scale for the broadcast band is calibrated so that a zero must be added to the number appearing on the dial to obtain the station frequency in kilocycles (KC). For example, a station listed as operating on 650 kilocycles would be found at 65 on the dial. The frequencies of FM stations are shown directly in megacycles on the top dial scale.

POWER-TONE CONTROL - This is a combination power switch and 4 position tone control. In the fully counterclockwise position, the receiver is turned off. To turn the receiver on, rotate the control clockwise to any of the four remaining positions. The control settings generally used for speech are VOICE and NORMAL while for the reproduction of records and musical broadcast programs, the BASS and HI-FI positions are usually more desirable. If maximum fidelity is desired, the control should be set at HI-FI.

VOLUME CONTROL - Use this control to regulate receiver volume. Turn it clockwise to increase volume and counterclockwise to decrease volume.

BAND SWITCH - This control has three positions: PHONO, BROADCAST and FM. When set at FM, the receiver tunes the 88-108 megacycle FM band; when set at BROADCAST it tunes the 540-1750 kilocycle standard broadcast range. For record player operation, set the switch at PHONO and operate the VOLUME and POWER-TONE controls as explained above.

TUNING CONTROL - Use this control to tune in the desired station. Turn the control until the station is heard and then rotate it back and forth until the signal is clearest and strongest. If the signal is too strong, reduce it by means of the VOLUME control, not by using the TUNING control. When tuning in FM stations, the receiver will tend to pull the station into tune. This is the automatic frequency control circuit "taking hold". Once the station has been carefully tuned in, this circuit will hold it in perfect tune, assuring you of distortion - free FM reception.

SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of your receiver, contact your dealer. Make no service shipments to the factory as the Hallicrafters Co. will not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER which displays the sign shown at the right of the page. For the location of the one nearest you, consult your dealer or telephone directory.



The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

92X1401

SERVICE INSTRUCTIONS

GENERAL SPECIFICATIONS

Tubes	11 including 1 rectifier
Speaker Output Impedances	3.2 and 500 ohms
Antenna Provisions	Terminals for a single wire AM antenna and an FM dipole antenna. (See page 3.)
Intermediate Frequencies	AM - 455 KC FM - 10.7 MC
Frequency Ranges	AM - 540-1750 KC FM - 88-108 MC
Power Supply	105-125 volts 50/60 cycles AC
Power Consumption	90 watts

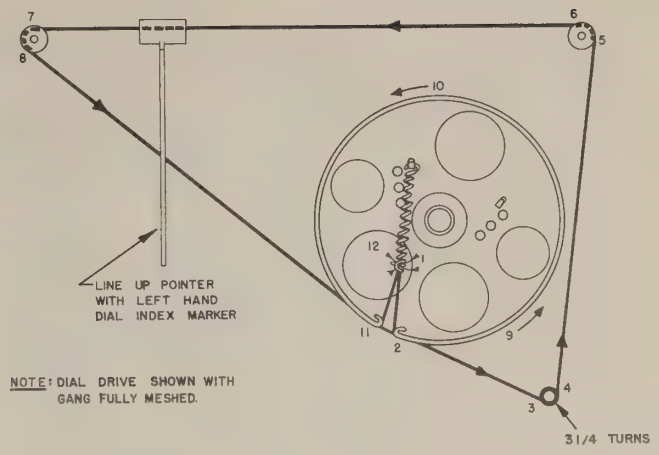


Fig. 6. Dial Cord Stringing Diagram

TUBE AND DIAL LAMP REPLACEMENT - Refer to Fig. 9 for the location of the tubes and dial lamps used in the receiver. When replacing tubes, check the tube type carefully and replace it with the correct type. To install an octal tube, insert the center guide pin into the center hole of the tube socket, rotate the tube until the key drops into position and then push the tube down until it is held firmly in the socket. To install a miniature type, line up the tube pins with the holes in the socket and then gently push the tube down until it is held firmly in the socket. The dial lamps and sockets can be removed by compressing the side springs on the socket. Dial lamp replacement should be made with a type 44 pilot lamp.

DIAL CORD STRINGING - Set the tuning capacitor in a fully meshed position. Tie one end of a 48 inch length of dial cord to the tension spring at position 1 as shown in Fig. 6. Follow the stringing procedure 1 through 12. At position 12, stretch the spring and tie the cord securely to the spring. With the tuning capacitor fully meshed, attach the dial pointer to the cord and align it with the left hand index marks on the dial. Cement the pointer to the cord with a drop of quick drying cement.

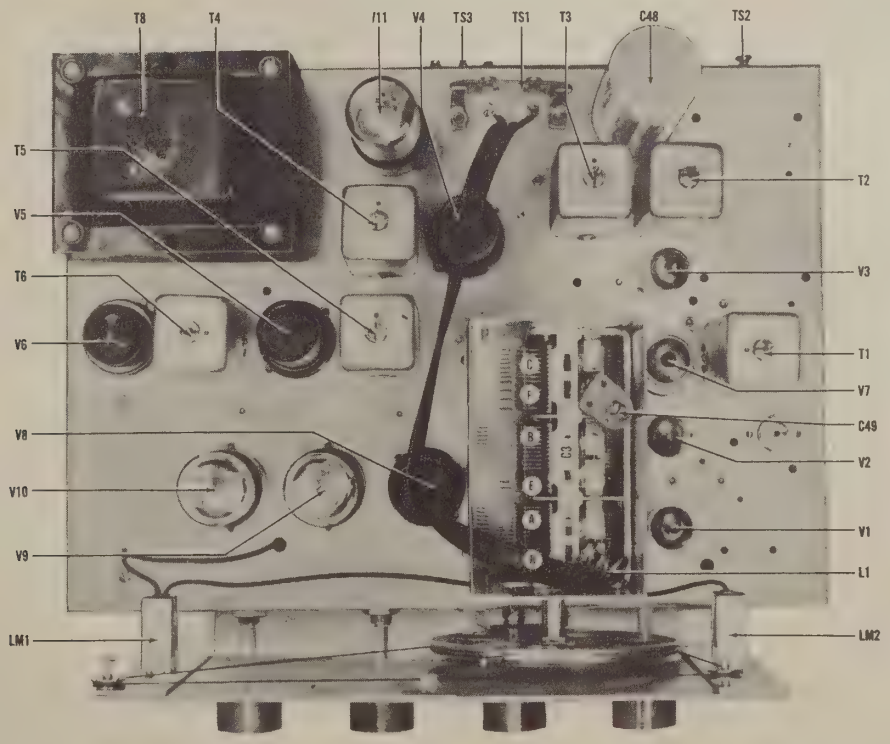


Fig. 7. Top View of Chassis Showing Component Location

ALIGNMENT INSTRUCTIONS

- Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.
- Use an amplitude modulated generator and output meter for AM alignment and an unmodulated generator and VTVM for FM alignment.
- Set the VOLUME control at maximum and POWER-TONE control at NORMAL.
- Use a non-metallic alignment tool.
- Refer to Figs. 9 and 10 for all alignment adjustments.

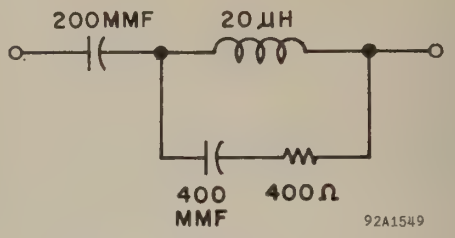


Fig. 8. RMA Dummy Antenna

Step	Signal Generator Connections	Generator Frequency	Band Switch Setting	Receiver Dial Setting	Output Connections	Adjust
			AM IF ALIGNMENT			
1	High side thru .01 mfd. cap. to point 1 on tuning gang. Low side to chassis.	455 KC (Modulated)	BC	1000 KC	Connect output meter across speaker voice coil.	A, B, C, D and E for max. output. Keep reducing gen. output so that meter reading does not exceed 500 milliwatts.
			FM IF & DISCRIM. PRI. ALIGNMENT			
2	High side thru .01 mfd. cap. to point 2 on tuning gang. Low side to chassis.	10.7 MC (Unmodulated)	FM	90 MC	Connect VTVM probe to point 3 (pin 3 of 6H6). Common lead to chassis.	F, G, H, I, J and K for max. output. Keep reducing gen. output to keep VTVM reading at approx. 12 volts DC. See Note A below.
			FM DISCRIM. SEC. ALIGNMENT			
3	Same as Step 2.	10.7 MC (Unmodulated)	FM	90 MC	Connect VTVM probe to point 4. Common lead to chassis.	L for zero reading on VTVM. The correct zero point is between a positive and negative maximum.
			AM RF ALIGNMENT			
4	High side thru RMA dummy antenna (see Fig. 8) to terminal A on back of chassis. Low side to terminal G.	1500 KC (Modulated)	BC	1500 KC	Connect output meter across speaker voice coil.	M, N and O for maximum output. Keep reducing gen. output so that meter reading does not exceed 500 milliwatts.
			FM RF ALIGNMENT			
5	High side thru 300 ohm carbon resistor to terminal D on top of chassis. Low side to other terminal marked D.	105 MC (Unmodulated)	FM	105 MC	Connect VTVM probe to point 5. Common lead to chassis.	P, Q and R for maximum output. (See Note B below.) Keep reducing gen. output to keep VTVM reading at approx. 1 volt DC.

NOTE A - When adjusting the 2nd and 3rd FM IF's, shunt a 4700 ohm resistor across the secondary when adjusting the primary and then shunt the same resistor across the primary when adjusting the secondary. Remove the resistor after completing the alignment. Refer to the schematic diagram for the transformer primary and secondary pin connections.

NOTE B - To avoid AFC action, short point 6 to chassis before making these adjustments.

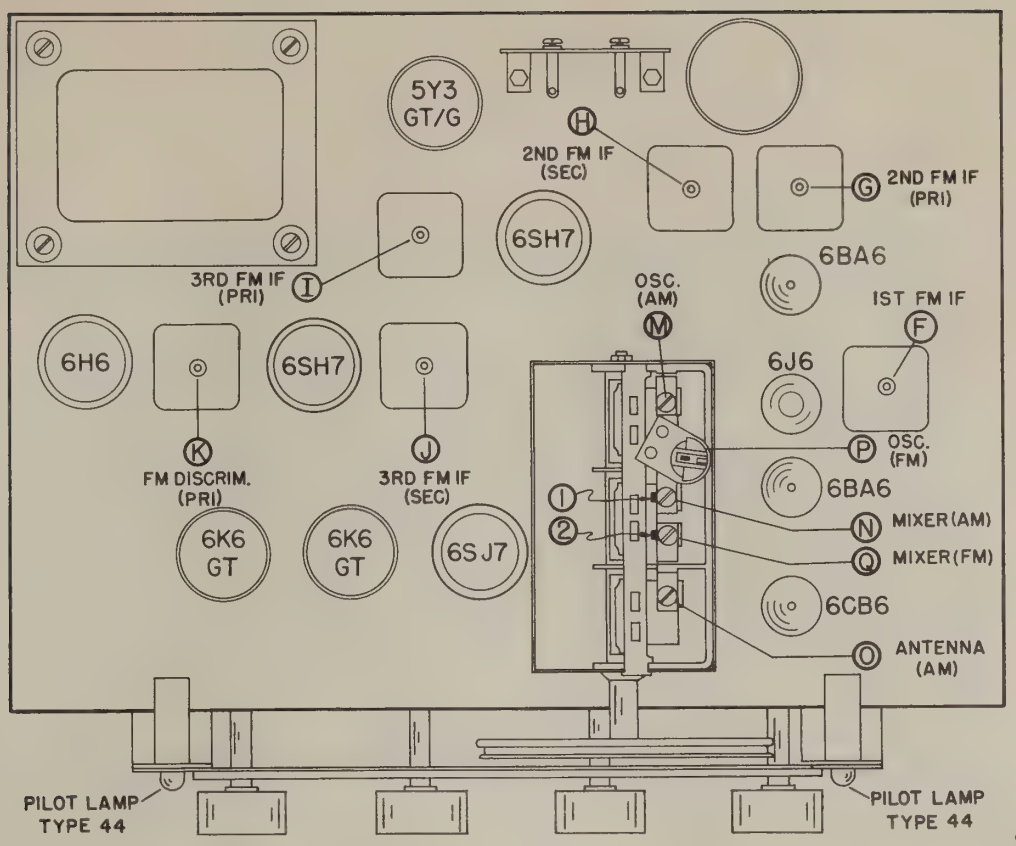


Fig. 9. Top View of Chassis Showing Location of Alignment Adjustments, Tubes and Dial Lamps

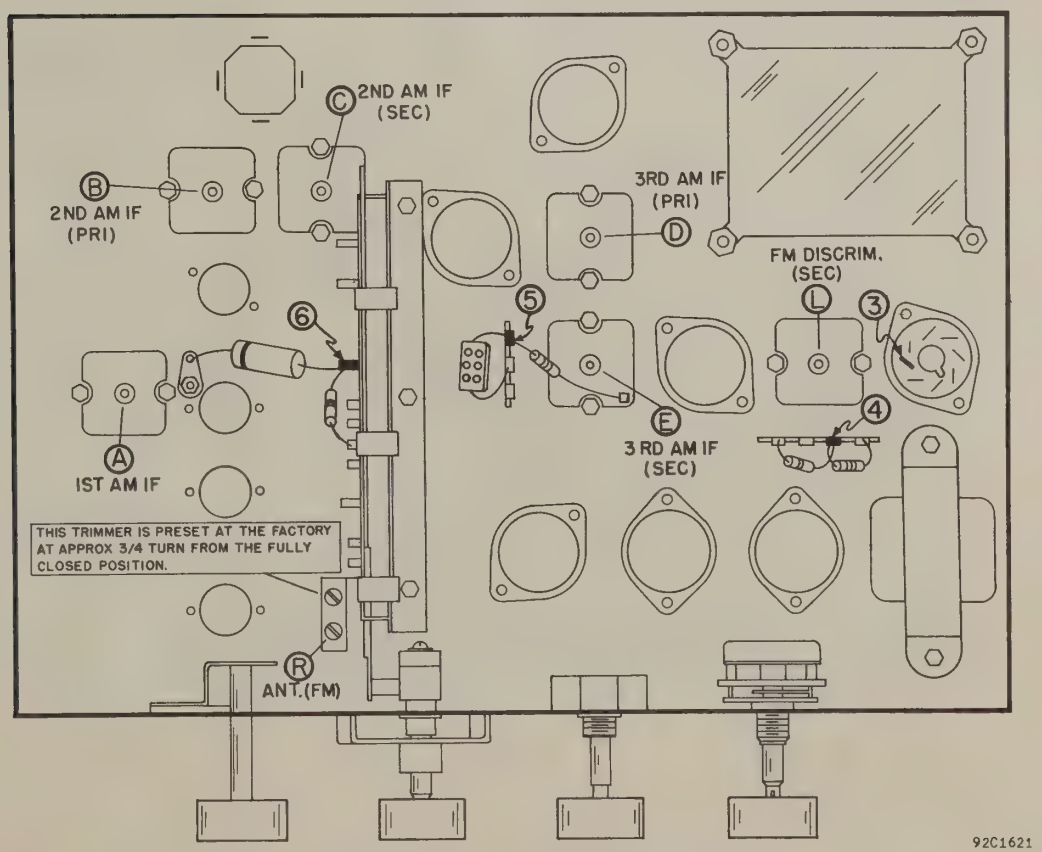


Fig. 10. Bottom View of Chassis Showing Location of Alignment Adjustments

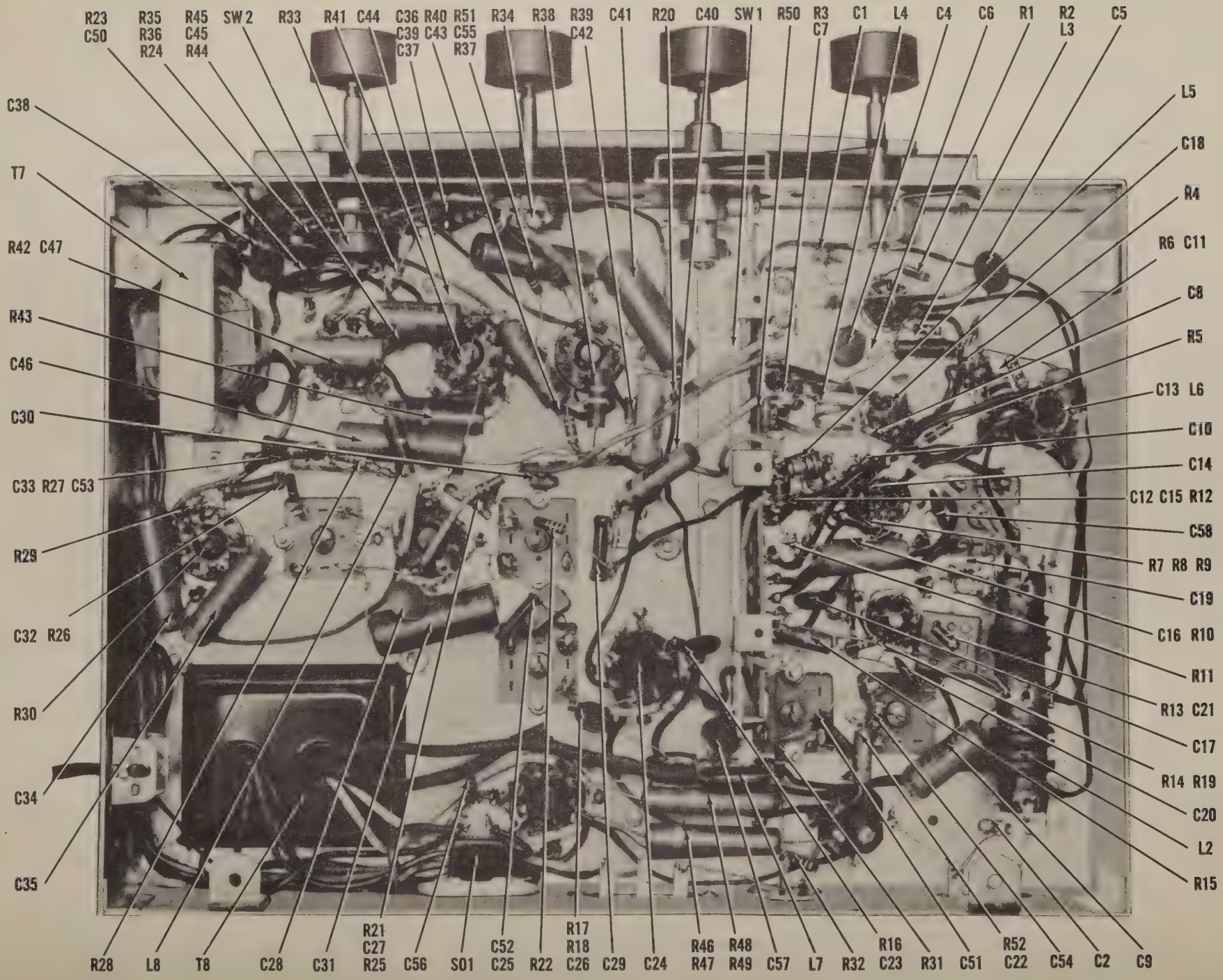


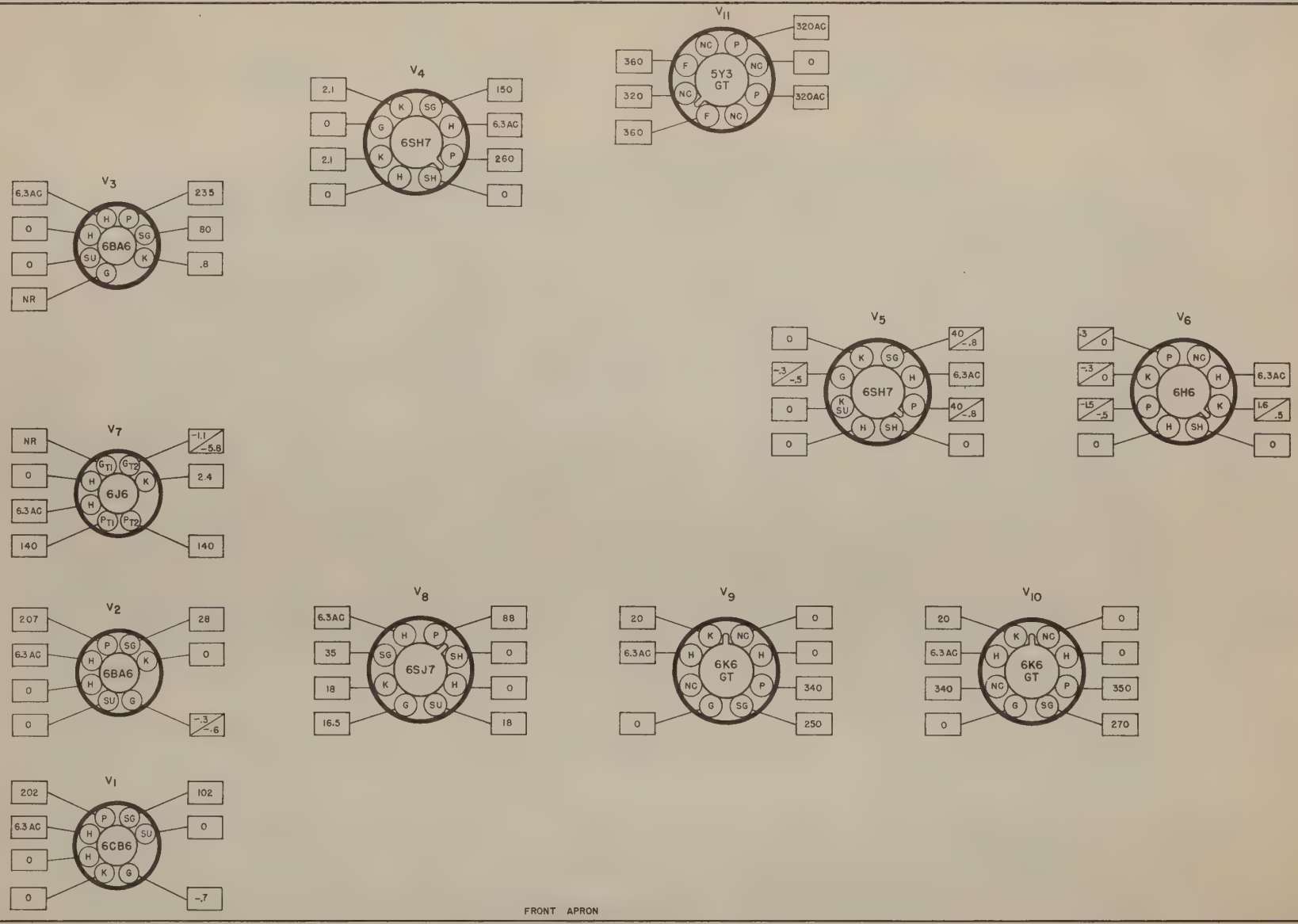
Fig. 11. Bottom View of Chassis Showing Component Location

92X1623

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,7,15,19	100 mmf. 500 V., ceramic	47B20101M5
C-3A,B,C,D, E and F	Tuning capacitor assembly	48C277
C-4,14,18,20, 23,24,26	5000 mmf. 450V., ceramic disc	47A168
C-5,17,28,50, 56,57,58	10,000 mmf. 450V., ceramic disc.	47A217
C-6	33 mmf. 500V., ceramic	47X20UK330K
C-8	3.3 mmf. 500 V., bakelite gimmick	47A160-5
C-9,34,35	.05 mfd. 200V., tubular	46AU503J
C-10,12,27	47 mmf. 500V., ceramic	47X20UK470M
C-11	7 mmf. 500V., ceramic	47X20UJ070K
C-13,36,43,45	.01 mfd. 600V., tubular	46AZ103F
C-16	.02 mfd. 200V., tubular	46AU203J
C-21	1800 mmf. 500V., ceramic	47B35182K5
C-22,54	5 mmf. 500V., ceramic	47X20UK050K
C-25	12 mmf. 500V., ceramic	47B20120K5
C-29,32,33,53	150 mmf. 500V., ceramic	47B20151M5
C-30,37	1000 mmf. 500V., ceramic	47B20102M5
C-31,41	.05 mfd. 600V., tubular	46AY503J
C-38	.03 mfd. 200V., tubular	46AU303J
C-39	68 mmf. 500V., ceramic	47B20680M5
C-40	.003 mfd. 600V., tubular	46AZ302J
C-42	.005 mfd. 600V., tubular	46AZ502J
C-44	220 mmf. 500V., ceramic	47B20221M5
C-46,55	10 mfd. 25V., electrolytic	45A121
C-47	.002 mfd. 600V., tubular	46AZ202J
C-48A,B and C	60-20-20 mfd. 450V., electrolytic	45B113
C-49	Trimmer, 4-20 mmf.; ceramic	44A115
C-51,52	1.3 mmf. gimmick	47A290
	RESISTORS	
R-1,13	1 megohm ½ watt, carbon	23X20X105M
R-2,14,17, 27,28	47,000 ohms ½ watt, carbon	23X20X473M
R-3,5,26,31	220,000 ohms ½ watt, carbon	23X20X224M
R-4	470 ohms ½ watt, carbon	23X20X471M
R-6	4700 ohms 2 watts, carbon	23X40X472M
R-7	10 ohms ½ watt, carbon	23X20X100M
R-8,25	22,000 ohms ½ watt, carbon	23X20X223M
R-9	150 ohms ½ watt, carbon	23X20X151K
R-10	220 ohms ½ watt, carbon	23X20X221M
R-11,21,33	100,000 ohms ½ watt, carbon	23X20X104M
R-12,32,40, 41,42	470,000 ohms ½ watt, carbon	23X20X474M
R-15,52	1000 ohms 1 watt, carbon	23X30X102K
R-16	270 ohms ½ watt, carbon	23X20X271K
R-18,23	1000 ohms ½ watt, carbon	23X20X102M
R-19,39	2.2 megohms ½ watt, carbon	23X20X225M
R-20	68,000 ohms ½ watt, carbon	23X20X683M
R-22	330,000 ohms ½ watt, carbon	23X20X334M
R-24	15,000 ohms ½ watt, carbon	23X20X153K
R-29,30	100,000 ohms ½ watt, carbon	23X20X104K
R-34	VOLUME control, 2 megohms	25B623
R-35,36,44,50	6800 ohms ½ watt, carbon	23X20X682M
R-37	330 ohms ½ watt, carbon	23X20X331K
R-38	100,000 ohms 1 watt, carbon	23X30X104K
R-43	300 ohms 2 watts, carbon	23X40X301J
R-45	12,000 ohms ½ watt, carbon	23X20X123K
R-46,47	1200 ohms 2 watts, carbon	23X40X122K
R-48,49	1500 ohms 2 watts, carbon	23X40X152K
R-51	10,000 ohms ½ watt, carbon	23X20X103K
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; FM	51A1485
L-2	Coil, antenna; AM	51B1059
L-3	Choke, RF; plate load	53A124

Schematic Symbol	Description	Hallicrafters Part Number
	COILS AND TRANSFORMERS (Cont.)	
L-4	Coil, RF; FM	51B1022
L-5	Coil, oscillator; FM	51B1486
L-6	Coil, oscillator; AM	51B1020
L-7,8	Choke, filament; RF decoupling	53A123
T-1	Transformer, IF; mixer	50B523
T-2,4	Transformer, IF; plate	50B407
T-3,5	Transformer, IF; grid	50B408
T-6	Transformer, discriminator	50B410
T-7	Transformer, audio output	55B158
T-8	Transformer, power	52C152
	SWITCHES	
SW-1A,B,C, D and E	Band switch assembly	60B462
SW-2A,B and C	Switch, tone and AC on-off	60B319
	PLUGS AND SOCKETS	
PL-1	Line cord and plug	87A078
SO-1	Receptacle, AC; for phono motor	10A015
SO-2	Socket, phono	36A041
	Socket, miniature 7 pin tube; molded mica filled	6A347
	Socket, miniature 7 pin tube; molded bakelite	6A297
	Socket, octal tube; molded bakelite	6A296
	TUBES, RECTIFIERS AND DIAL LAMPS	
V-1	6CB6: RF amplifier (FM only)	90X6CB6
V-2,3	6BA6: mixer, 1st IF amplifier	90X6BA6
V-4,5	6SH7: 2nd IF amplifier, FM limiter and AM detector	90X6SH7
V-6	6H6: FM discriminator	90X6H6
V-7	6J6: oscillator and AFC	90X6J6
V-8	6SJ7: audio amplifier	90X6SJ7
V-9,10	6K6GT: audio output	90X6K6GT
V-11	5Y3GT/G: rectifier	90X5Y3GT/G
LM-1,2	Lamp, pilot; 6-8V. 250 ma., type 44	39A003
	MISCELLANEOUS PARTS	
	Cord, dial; 48 inches	38A019
	Dial background (paper)	32A446
	Dial scale	22C313
	Escutcheon	7D067
	Glass, escutcheon	22B205
	Grommet, rubber	16A119
	Knob, VOLUME and TUNING	15B068-3
	Knob, PWR-TONE and BAND SWITCH	15B077-3
	Lock, line cord	76A2
	Mounting foot, rubber	16A007
	Pilot lamp assembly; includes both sockets	86B126
	Pointer, dial	82A147
	Shaft, tuning	74A247
	Shield, tube	69A471
	Spring, contact; for grounding band switch to chassis in FM position	75A140
	Spring, dial cord	75A012
TS-2	Terminal strip, antenna (marked A-G)	88A327
TS-1	Terminal strip, antenna (marked D-D)	88A379
TS-3	Terminal strip, speaker (marked 3.2, 500 and G)	88A578



BOTTOM VIEW OF CHASSIS

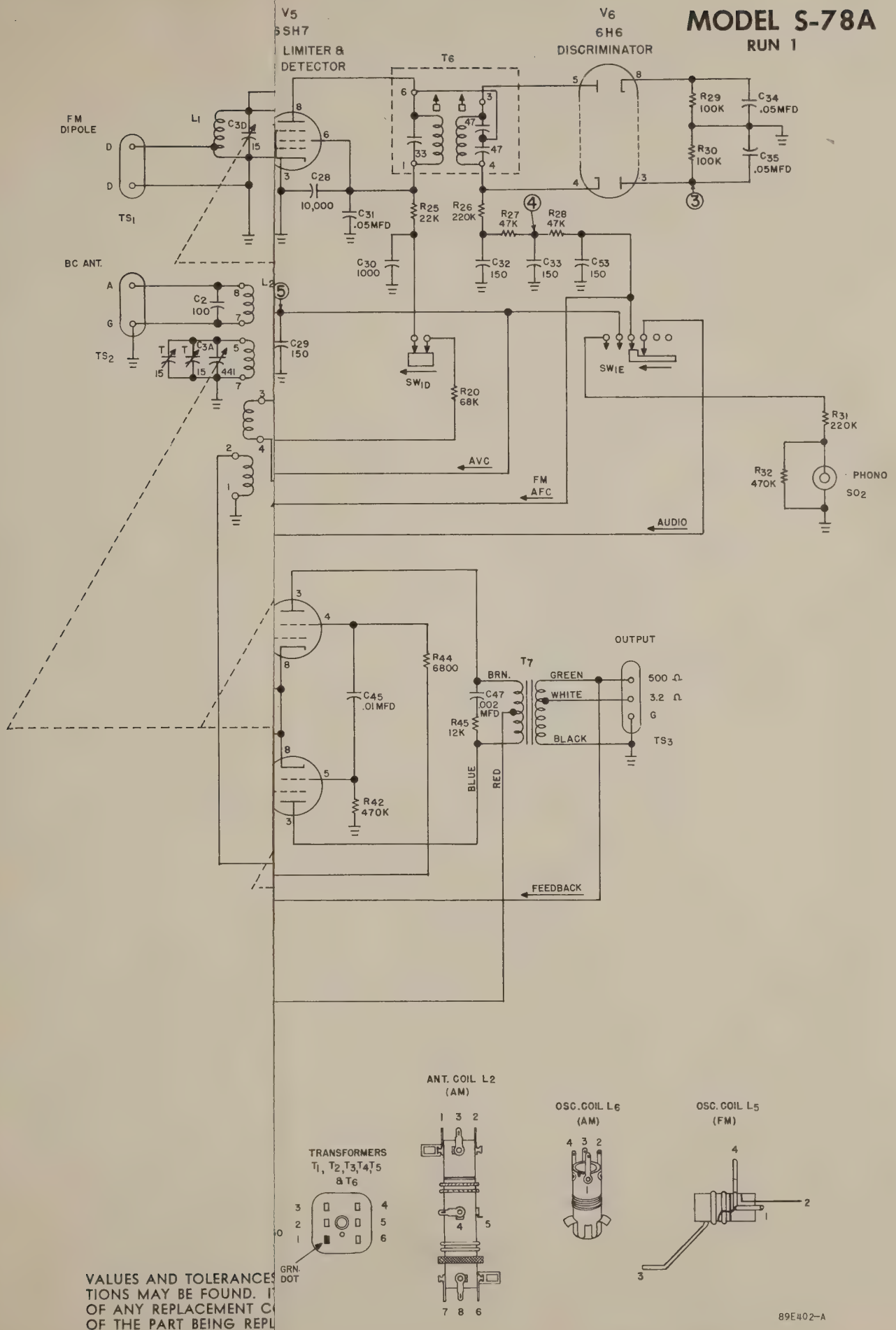
NOTES

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ANTENNAS DISCONNECTED, SPEAKER CONNECTED, VOLUME CONTROL AT MAXIMUM, POWER-TONE CONTROL AT VOICE AND TUNING GANG FULLY MESHED.
3. LINE VOLTAGE – 117 VOLTS AC
4. ALL VOLTAGES WERE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM) AND ARE DC AND POSITIVE UNLESS OTHERWISE SPECIFIED.
5. NC – NO CONNECTION
6. FM/AM WHERE TUBE SOCKET VOLTAGES CHANGE FROM FM TO AM RECEPTION TWO READINGS ARE SHOWN. THE UPPER READING IS WITH THE BAND SWITCH AT FM AND THE LOWER READING IS WITH THE SWITCH AT AM.
7. NR – NOT READABLE

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Fig. 12. Tube Socket Voltage Chart

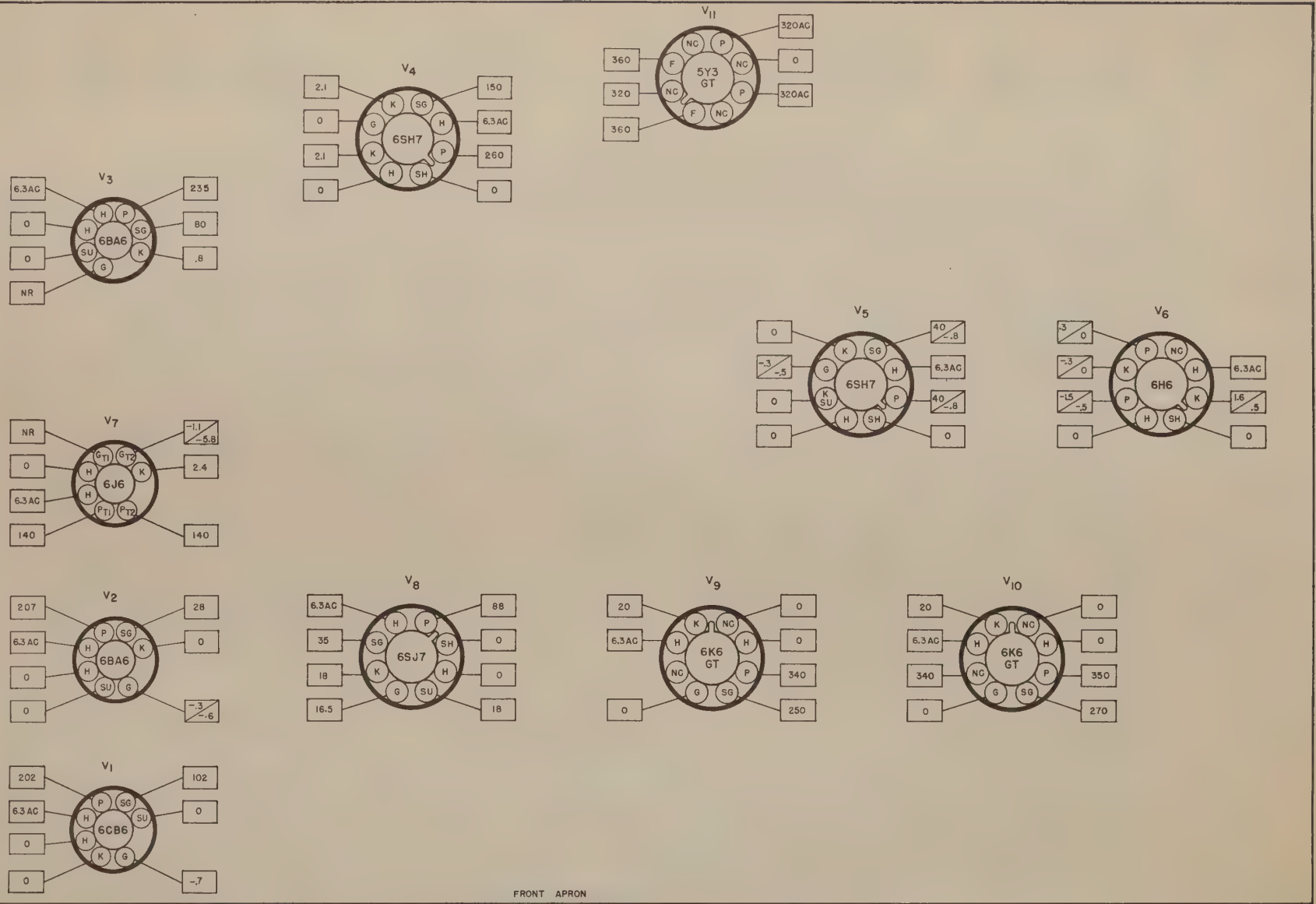
MODEL S-78A
RUN 1



89E402-A

VALUES AND TOLERANCES
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Fig. 13. Schematic Diagram



FRONT APRON

BOTTOM VIEW OF CHASSIS

NOTES

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ANTENNAS DISCONNECTED, SPEAKER CONNECTED, VOLUME CONTROL AT MAXIMUM, POWER-TONE CONTROL AT VOICE AND TUNING GANG FULLY MESHED.
3. LINE VOLTAGE—117 VOLTS AC
4. ALL VOLTAGES WERE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM) AND ARE DC AND POSITIVE UNLESS OTHERWISE SPECIFIED.
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7. NR—NOT READABLE

9201624

Fig. 12. Tube Socket Voltage Chart

MODEL S-78A
RUN 1

V1 6CB6 RF AMP(FM)
V2 6BA6 MIXER
V3 6BA6 1ST IF
V4 6SH7 2ND IF
V5 6SH7 FM LIMITER & AM DETECTOR
V6 6H6 DISCRIMINATOR
V7 6J6 OSC & AFC
V8 6SJ7 AUDIO AMP
V9 6K6-GT/G AUDIO OUTPUT
V10 6K6-GT/G AUDIO OUTPUT
V11 5Y3GT/G RECTIFIER

FM DIPOLE
BC ANT
PL1 105-125 V. 50/60 ~ AC
SO1 PHONO MOTOR
SO2 PHONO
TS1 TS2 TS3
SW1A SW1B SW1C SW1D SW1E
SW2A FRONT SW2B REAR
VOLUME R34 2 MEG
T1 T2 T3 T4 T5 T6 T7 T8
L1 L2 L3 L4 L5 L6 L7 L8
LM1 LM2
B+
AVC
FM AFC
AUDIO
FEEDBACK
OUTPUT 500 Ω 3.2 Ω G
BRN. GREEN WHITE BLACK BLUE RED

NOTES
1. RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTORS HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. BAND SWITCH SW-1 SHOWN IN EXTREME CLOCKWISE OR FM POSITION (PHONO-AM-FM)
4. POWER-TONE SWITCH SHOWN IN EXTREME COUNTERCLOCKWISE OR "OFF" POSITION.(OFF-VOICE-NORMAL-BASS-HI FI)
5. K=1000
✱ THESE CAPACITORS HAVE NEGATIVE TEMPERATURE COEFFICIENT OF 750
⊙ VALUE OF THESE GIMMICKS IS CRITICAL AS THEY DETERMINE THE FM IF BANDWIDTH.

LAST RESISTOR SYMBOL R-52
LAST CAPACITOR SYMBOL C-58

TRANSFORMERS T_1, T_2, T_3, T_4, T_5 & T_6
GRN DOT

ANT. COIL L2 (AM)
OSC. COIL L6 (AM)
OSC. COIL L5 (FM)

89E402-A

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

Fig. 13. Schematic Diagram

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X820
1151 - RUN 1

communications

OPERATING and SERVICE INSTRUCTIONS

S-80
RUN 1

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

DESCRIPTION

Your Hallicrafters Model S-80, the "Defender", is a super-sensitive, four tube battery operated radio specially designed for use in rural and remote areas where commercial power is not available. It covers both the standard broadcast band and the 6 to 18 megacycle shortwave range thus assuring 24 hour reception even in weak signal areas where the broadcast band "blacks-out" in daytime.

The receiver is designed to operate from any standard 1½ volt "A" - 90 volt "B" heavy duty battery pack such as listed below under BATTERY INSTALLATION. These batteries will provide over 1,000 hours or approximately one year of service and will fit inside the rear of the cabinet. A special feature is the battery saver switch, a slide switch located on the chassis which will provide approximately 50 hours of additional battery operation at the normal end life of the battery.

Operation of the receiver in metropolitan areas from commercial power is easily possible by the use of a moderate cost power converter such as Perma Power Model A or Sears "Power Shifter". Such a unit equips the receiver for 110-120 volt, 50 or 60 cycle AC operation.



Model S-80 Defender

The tuning dial is of the slide rule type with separate dial scales for both the standard broadcast and shortwave bands. Major foreign cities are clearly indicated on the shortwave portion of the dial to facilitate tuning. Shortwave services covered by this receiver include the following international shortwave bands: 5.9 to 6.2 MC, 9.5 to 9.7 MC, 11.7 to 11.9 MC, 15.1 to 15.45 MC and 17.7 to 17.9 MC.

To get the utmost enjoyment from your Hallicrafters receiver, carefully follow the instructions contained in this book.

OPERATING INSTRUCTIONS

BATTERY INSTALLATION

1. The receiver is designed to operate from any one of the following combination 90 and 1½ volt farm battery packs: Sears 06308, Wards 51, Burgess 17GD60, RCA VSO 99, General 60DL-11L, Eveready 748, Ray-O-Vac AB-82, Bond 0528 or Ensign AB48.

2. Place the battery pack into the compartment provided in the rear of the cabinet and insert the BATTERY CABLE PLUG (see Fig. 3) into the receptacle located on the battery.

3. Set the BATTERY SAVER SWITCH on the top right of the chassis to the NEW POSITION. (See Fig. 3.) This switch should be set at NEW whenever a new battery pack is installed.

   NOTE: Maximum battery life will be obtained if the receiver is operated intermittently, i.e., for short periods of time, instead of continuously for prolonged periods.

4. When the volume of stations decreases noticeably due to the battery approaching the end of its normal operating life, set the BATTERY SAVER SWITCH at USED.

5. When reception becomes weak even with the BATTERY SAVER SWITCH at USED, replace the battery pack.

ANTENNA INSTALLATION

Two leads have been provided at the top left of the chassis for antenna and ground connections. A satisfactory antenna in most cases is 30 to 60 feet of wire connected to the green lead and run about the room in any convenient manner. A good ground connection is required when this type of antenna is employed. For best results, an outside antenna should be used.

SINGLE WIRE ANTENNA

1. Construct the antenna as shown in Fig. 1 and connect it to the green lead located on the top left of the chassis. (See Fig. 3.)

2. Erect the antenna as high as possible and free from surrounding objects.

3. Use an Underwriters approved lightning arrester designed for single lead-in at the point where the lead-in enters the house.

4. Connect the black lead located at the top left of the chassis to a cold water pipe or other good ground such as a six foot ground rod driven into moist soil.

For shortwave reception, a doublet antenna with a 300 ohm ribbon type transmission line is recommended. The doublet antenna, when properly constructed and installed, will provide excellent world-wide shortwave reception as well as standard broadcast reception.

DOUBLET ANTENNA

1. Construct the antenna as shown in Fig. 2. Note that the antenna is $19\frac{1}{2}$ feet long each side of center, the two sections being insulated from one another.

2. Use a length of 300 ohm ribbon type transmission line, commonly called twin-lead, as the lead-in from the antenna to the receiver. Connect one end of the transmission line to the two $19\frac{1}{2}$ foot antenna sections and the other end to the black and green leads located at the top left of the chassis.

3. Use an Underwriters approved lightning arrester designed for twin-lead at the point where the lead-in enters the house.

4. No ground connection is required with the doublet antenna.

TUNING DIAL

1. The standard broadcast band is calibrated in kilocycles with a zero deleted for convenience. To convert the dial reading to the station frequency in kilocycles, add one zero.

2. The shortwave band is calibrated directly in megacycles.

STANDARD BROADCAST AND SHORT WAVE RECEPTION

1. Set the SHORTWAVE-BROADCAST control knob to BROADCAST for standard broadcast reception or to SHORTWAVE for shortwave reception.

2. Turn the receiver ON by rotating the VOLUME control knob clockwise. Turn this control to a well advanced position and reset it for the desired volume after a station has been tuned in.

3. Tune in the desired station by turning the TUNING CONTROL knob slowly until the dial pointer indicates the station frequency.

4. Readjust the VOLUME control for the desired volume.

5. To turn the receiver OFF, turn the VOLUME control knob counterclockwise until a click is heard.

BEST SHORTWAVE RECEPTION TABLE

BAND	MOST FAVORABLE TIME	MOST FAVORABLE DISTANCE	
6-7 MC	Night - Winter	Day - 400 Miles	Night - Over 1500 Miles
9-10 MC	Day - Late Afternoon and Night - Winter	Over 500 Miles	
11-12 MC	Evenings or Late Summer Afternoons	Day - Under 1500 Miles	Night - Over 1500 Miles
15-18 MC	Early Mornings and Summer Evenings	Over 1500 Miles	

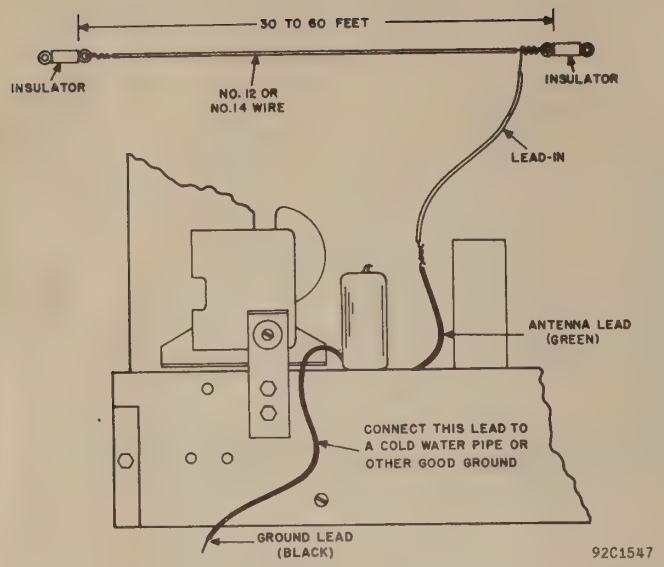


Fig. 1. Single Wire Antenna Installation

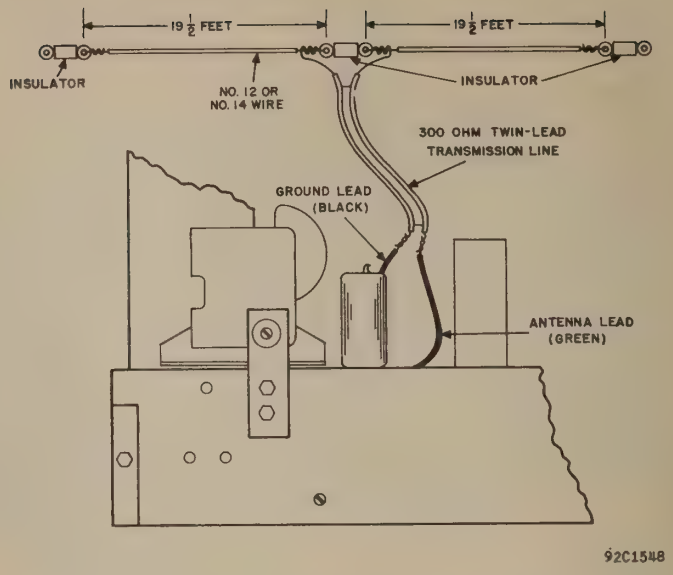


Fig. 2. Doublet Antenna Installation

SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes . . . . . Four
Speaker . . . . . 5 inch PM
Speaker Voice Coil Impedance . . . . . 3.2 ohms
Intermediate Frequency . . . . . 455 KC
Antenna . . . . . Provision for external single wire or doublet antenna.
Power Supply. . . .90 volt "B" - 1½ volt "A" battery pack
Frequency Coverage. . . . .540 - 1620 KC and 6 - 18 MC

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 3. To gain access to all tubes, slide the battery pack out of the cabinet. When installing a replacement tube, line up the seven pins on the tube with the socket holes and push down on the tube until the base of the tube rests firmly on the socket. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

REPLACEMENT BATTERY PACKS - Sears 06308, Wards 51, Burgess 17GD60, RCA VSO 99, General 60DL-11L, Eveready 748, Ray-O-Vac AB-82, Bond 0528 and Ensign AB48.

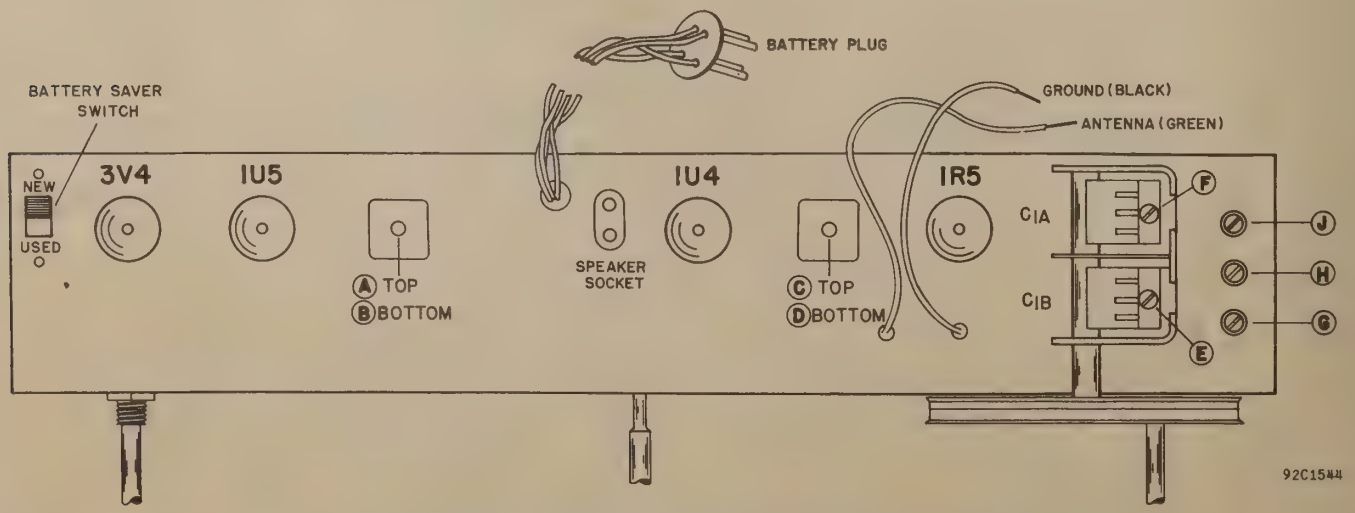


Fig. 3. Top View of Chassis Showing Location of Alignment Adjustments and Tubes

ALIGNMENT PROCEDURE

- Connect output meter across speaker voice coil.
- Set volume control at maximum.
- Use a non-metallic alignment tool.
- Signal generator must have a modulated output and cover 455 KC, 600 KC, 1300 KC and 14 MC.
- Keep the generator output as low as possible to avoid AVC action.
- Refer to Fig. 3 for location of alignment adjustments.

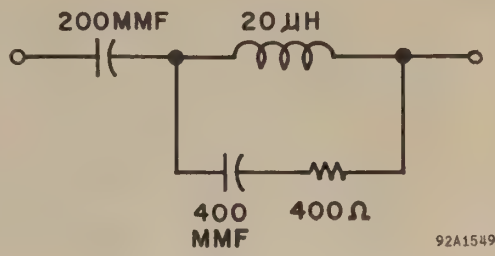


Fig. 4. RTMA Dummy Antenna

STEP	SIGNAL GENERATOR CONNECTIONS	SIGNAL GENERATOR FREQUENCY	BAND SWITCH SETTING	RECEIVER DIAL SETTING	ADJUST FOR MAXIMUM OUTPUT
1	High side to stator plates of rear section of tuning capacitor through a .01 mfd. capacitor. Low side to chassis.	455 KC	BROADCAST	1000 KC	A, B, C, D
2	High side to green antenna lead (Fig. 3) through a standard RTMA dummy antenna (Fig. 4). Low side to chassis.	14 MC	SHORTWAVE	14 MC	E, F
3	Same as STEP 2.	1300 KC	BROADCAST	1300 KC	G, H.
4	Same as STEP 2.	600 KC	BROADCAST	600 KC	J

DIAL CORD RESTRINGING

1. Set the tuning capacitor in a fully meshed position.
2. Tie one end of a 60 inch length of 30 lb. test dial cord to the tension spring at position 1. See Fig. 5.
3. Follow the stringing procedure 1 through 10. At position 10, stretch the spring and tie the cord securely to the spring.
4. With the tuning capacitor fully meshed, attach the dial pointer to the cord and align it with the left hand index marks on the dial. Cement the pointer to the cord with a drop of quick drying cement.

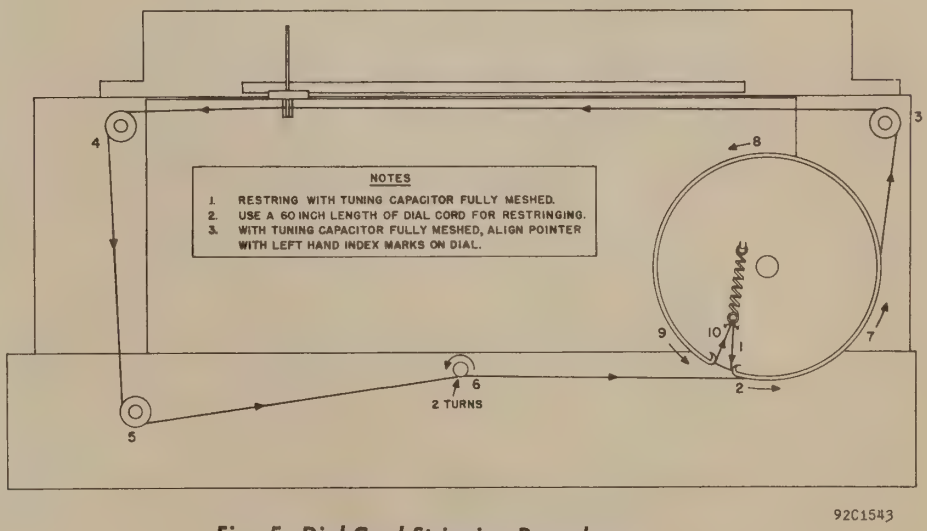


Fig. 5. Dial Cord Stringing Procedure

SERVICE OR OPERATING QUESTIONS - For additional information regarding operation or servicing of your receiver, contact the store from which you purchased your set. Make no service shipments to the factory as Hallicrafters will not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER which displays the sign shown at the right. For the location of the SERVICE CENTER nearest you, consult your dealer or telephone directory.

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92X1401

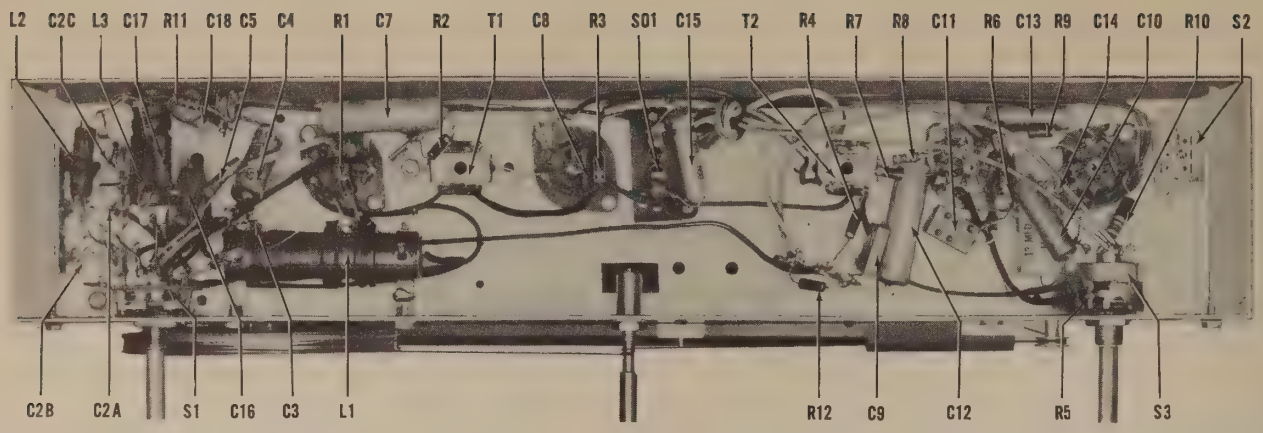


Fig. 6. Bottom View of Chassis Showing Component Location

92X1541

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1A,B	Tuning capacitor, 2 section	48C274
C-2A,B,C	Trimmer assembly; includes mtg. bracket and 3 trimmers	44C406
C-3	10 mmf. 500 V., ceramic	47B20A100K5
C-4	.05 mfd. 200 V., tubular	46A091
C-5,17	100 mmf. 500 V., ceramic	47B20A101K5
C-6	2.2 mmf. 500 V., ceramic	47A160-4
C-7,12	.02 mfd. 600 V., tubular	46AY203J
C-8	1000 mmf. 500 V., ceramic	47B20A102K5
C-9,11	220 mmf. 500 V., mica	47X20B221M
C-10,13	.005 mfd. 600 V., tubular	46AZ502J
C-14	12 mfd. 150 V., electrolytic	45B194
C-15	.002 mfd. 600 V., tubular	46AZ202J
C-16	4700 mmf. 500 V., mica	47X35B472K
C-18	.01 mfd. 600 V., tubular	46AY103J
	RESISTORS	
R-1	47,000 ohms 10%, ½ watt; carbon	23X20X473K
R-2	2200 ohms 10%, ½watt; carbon carbon	23X20X222K
R-3,6	4.7 megohms 10%, ½ watt; carbon	23X20X475K
R-4,9	2.2 megohms 10%, ½ watt, carbon	23X20X225K
R-5	VOLUME control, 1 megohm, includes ON-OFF switch S-3	25B959
R-7	1 megohm 10%, ½ watt, carbon	23X20X105K
R-8	5.6 megohms 20%, ½ watt, carbon	23X20X565M
R-10	.75 ohms 10%, ½ watt; carbon	23A062
R-11	22,000 ohms 10%, ½ watt; carbon	23X20X223K
R-12	330 ohms 10%, ½ watt; carbon	23X20X331K
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; BC and SW	51B1459
L-2	Coil, oscillator; BC	51B1460
L-3	Coil, oscillator; SW	51B1461
T-1	Transformer, IF; input	50C233
T-2	Transformer, IF; output	50C516
T-3	Transformer, audio output; part of speaker LS-1	--------
	PLUGS AND SOCKETS	
PL-1	Plug, speaker; part of speaker LS-1	--------
PL-2	Plug, battery cable; includes leads	87B1555-1
SO-1	Socket, speaker	6A275
	Socket, tube; miniature 7 pin	6A314
	SWITCHES	
S-1A,B,C,D	Switch, rotary wafer; SHORT WAVE-BROADCAST	60B461
S-2	Switch, slide (spst); NEW-USED BATTERY	60A244
S-3	Switch, ON-OFF; part of VOLUME control R-5	--------
	MISCELLANEOUS PARTS	
	Cabinet	66A754
	Clip, mtg.; for dial glass	76A412
	Clip, mtg.; for coil L-3	76A326
	Clip, mtg.; for transformers T-1 and T-2	76A385
	Clip, speed; for mounting front panel	76A413
	Dial cord, 57 inches	38A001
	Dial scale, glass	22C342
	Grille assembly	7C318
	Grommet, rubber	16A125
	Knob, VOLUME and SHORT WAVE - BROADCAST	15B322
	Knob, TUNING CONTROL	15B323
	Pointer, dial	82A205
	Retaining ring; for tuning shaft	76A649
	Shaft, tuning	74A500
LS-1	Speaker, 5" PM; includes output transformer T-3 and plug PL-1	85C085
	Spring, dial cord	75A012

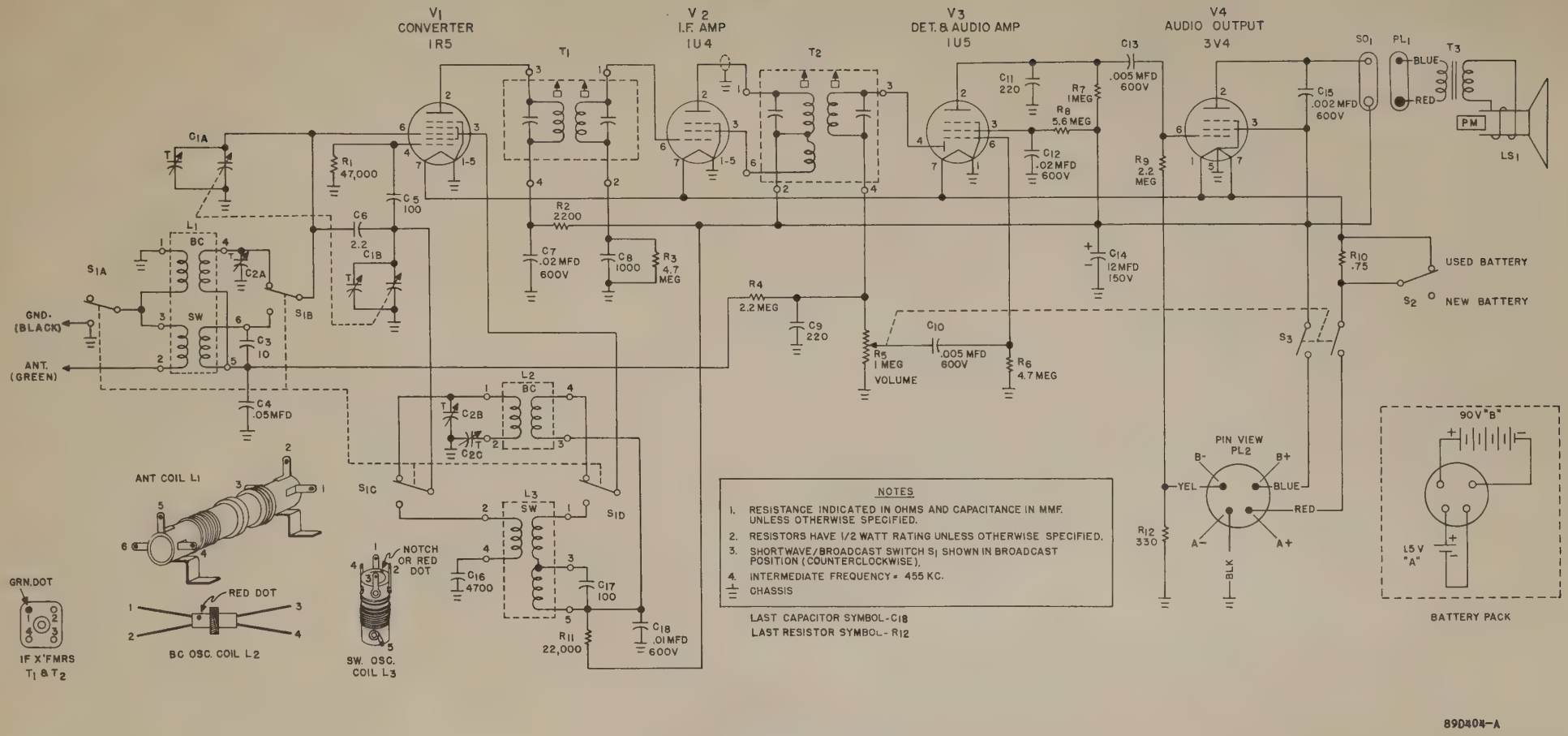


Fig. 7. Schematic Diagram

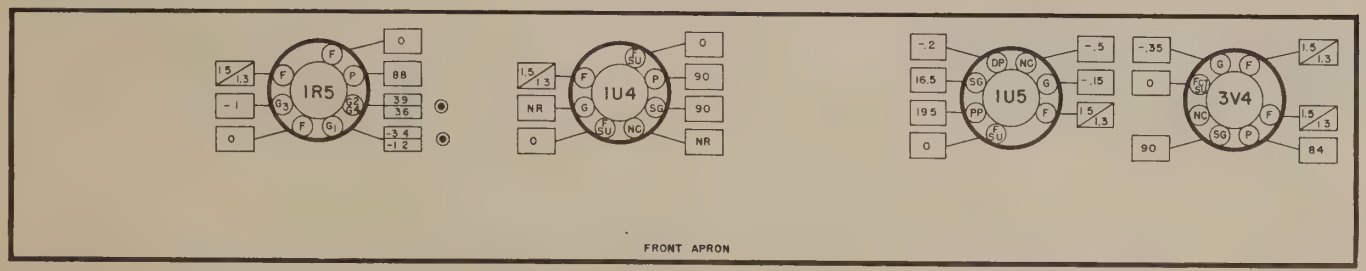


Fig. 8. Tube Socket Voltage Chart

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X777
951 - RUN 1

communications

OPERATING and SERVICE INSTRUCTIONS

S-81
RUN 1

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

Your Hallicrafters Model S-81 is an FM receiver which covers the police, fire, taxicab, railroad, private telephone, forestry and other industrial services operating in the 152 to 173 megacycle communication band. It uses a selenium rectifier and 6 tubes in a superheterodyne circuit with a ratio detector and is designed to operate from 105 to 125 volt direct current (DC) or 50/60 cycle alternating current (AC).

The dial is calibrated for both frequency and type of service. Due to the close spacing of channel assignments in the frequency range of the receiver, it is not possible to indicate all of the services on the dial. However, a complete listing of the services covered by the receiver as well as their frequency assignments can be found on page 3. In some localities, all of the available channels are not being used at the present time.



92X1560

Model S-81 Civic Patrol

A 5-inch Alnico V permanent magnet speaker is mounted in the top of the cabinet. For headphone operation, tip jacks have been provided on the rear of the chassis to accommodate any standard 500 to 3000 ohm headphones. The speaker-headphones selector switch is on the rear of the chassis.

Services similar to those covered by the S-81 also operate in the 30 to 50 megacycle range. A companion receiver, the S-82, covers this range and is available from your Hallicrafters dealer.

To get the maximum enjoyment from your Hallicrafters receiver, carefully follow the instructions contained in this book.

INSTALLATION INSTRUCTIONS

UNPACKING - Check all shipping labels and tags for instructions before removing or destroying them.

LOCATION - The receiver is equipped with rubber feet for table top or shelf mounting. When locating the receiver, avoid excessively warm locations near radiators, hot air outlets, etc. Ventilation openings have been provided in the top and back of the cabinet. Care should be taken not to allow these holes to be covered or ventilation impeded in any way.

POWER SOURCE - The receiver is designed to operate from 50/60 cycle 105-125 volt alternating current (AC) or 105-125 volt direct current (DC). The power consumption is 30 watts. If in doubt about your power supply, call your power company before plugging in the receiver. A wrong power supply may cause damage to the receiver.

IMPORTANT - When operating on DC, reverse the power plug at the wall outlet if the receiver does not operate after a one minute warm up period.

Mobile operation of the receiver is easily possible by the use of a 6 volt DC to 110 volt AC power inverter such as Cornell-Dubilier Model 6R10 or American Television and Radio Model 6-RSC. Such a unit equips the receiver for operation from 6 volt battery sources normally found in automobiles, trucks, etc.

ANTENNA INSTALLATION - The terminals marked A and G on the back of the receiver are for antenna and ground connections. To facilitate antenna installation, a two foot antenna wire has been included with your receiver. This antenna vertically mounted will provide reception of signals over a distance of approximately 7 to 10 miles. If you are located farther from a transmitting station, an outside antenna may be required. The outside antenna may be either a vertical whip or vertical doublet. A doublet antenna can be easily constructed from standard 300 ohm twin-lead TV transmission line. (See Fig. 1.) Whip antennas such as Master Mobile Mounts Models 113 and 114 are suitable for both outdoor and mobile use.

INDOOR ANTENNA (Supplied with Receiver)

1. Uncoil the antenna wire which has been included with your receiver and connect one end of it to terminal A.

2. Erect the antenna wire so that the major portion is vertical. The antenna may be held in a vertical position by fastening it to the cabinet back with a piece of tape.

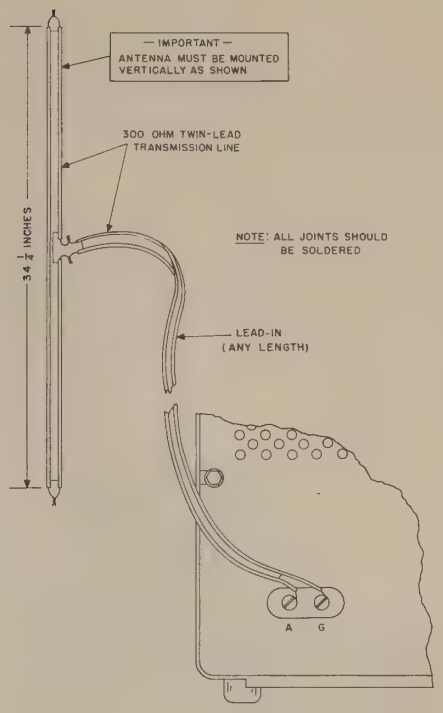
DOUBLET ANTENNA

1. Construct the antenna from a length of 300 ohm twin-lead transmission line as shown in Fig. 1.

2. All transmissions in the frequency range of the receiver are vertically polarized. For maximum signal pickup, the receiving antenna should also be similarly polarized. To properly polarize the doublet antenna, mount it so that length of the antenna is vertical.

3. The antenna should be erected as high as possible since the height of the antenna above ground determines the ability to pick up distant stations.

4. Use 300 ohm twin-lead transmission line as the lead-in from the antenna to the receiver. The lead-in should be run away at right angles to the antenna for at least 12 inches. At the receiver, connect the lead-in to terminals A and G.



92C1565-1

Fig. 1. Construction Details of the Doublet Antenna

OPERATING INSTRUCTIONS

To operate the receiver, perform the following simple steps:

1. Turn the receiver on by rotating the VOLUME control knob to the right. Allow about one minute for warm up. If the receiver fails to operate on DC, reverse the power plug at the wall outlet to obtain proper polarity.

2. Turn the VOLUME control knob to a well advanced position. This control will have to be reset for the desired volume level after a station has been tuned in.

3. Tune in the desired station by rotating the TUNING control knob slowly until the dial pointer indicates the station frequency. After the station is located, the pointer should be moved back and forth until the point of loudest and clearest reception is found.

4. Readjust the VOLUME control knob for the desired volume.

5. To turn the receiver off, turn the VOLUME control knob to the left until a click is heard.

***FREQUENCY ASSIGNMENTS OF SERVICES COVERED BY MODEL S-81**

Telephone - Base
152.51 - 152.81
152.03 - 152.2

Telephone - Mobile
157.77 - 158.07
158.49 - 158.67

Taxicabs - Base & Mobile
152.27 - 152.45

Taxicabs - Mobile Only
157.53 - 157.71

Special Emergency
157.47
159.51 - 161.99

Police
154.65 - 156.7
158.73 - 161.7

Fire
153.77 - 154.43
159.51 - 161.79
166.25
170.15

Forest Products Service
153.05 - 153.35
158.31 - 158.43

Petroleum
153.05 - 153.35
158.31 - 158.43

Highway Maintenance
156.99 - 157.41
159.51 - 161.79

Motion Picture
152.87 - 152.99

Power
153.41 - 153.71
158.13 - 158.25

Forestry
156.87 - 156.93
159.27 - 159.51
161.79
170.425 - 170.575
171.425 - 171.575
172.225 - 172.375

Railroad
159.51 - 161.91

*** All frequencies in megacycles.**

SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes and Rectifiers	6 tubes and 1 selenium rectifier
Speaker	5 inch PM
Voice Coil Impedance	3.2 ohms
Headphone Output Impedance	100 ohms
Antenna Input Impedance	72 ohms
Antenna	Vertically polarized whip or doublet (See Page 3)
Intermediate Frequency	10.7 MC
Power Supply	105-125 volts DC or 50-60 cycle AC
Frequency Coverage	152 to 173 MC

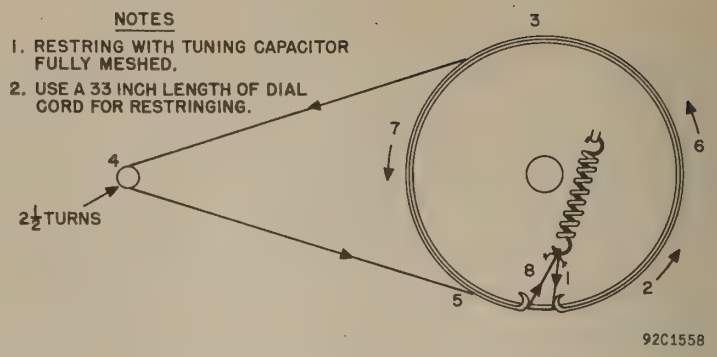


Fig. 2. Dial Cord Stringing Diagram

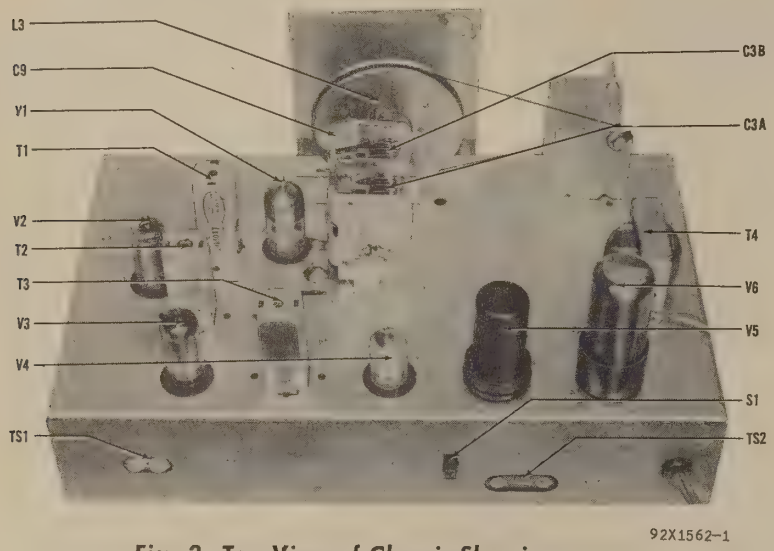


Fig. 3. Top View of Chassis Showing Component Location

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 4. Access to all tubes is possible by removing the cabinet back cover. When installing a replacement octal tube: (1) Insert the center guide pin of the tube into the center hole of the tube socket (2) Rotate the tube until the key on the guide pin drops into the notch in the socket hole and (3) Push down on the tube until the base of the tube rests firmly on the socket. When installing a replacement miniature tube, line up the seven pins on the tube with the socket holes before pushing the tube into place. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

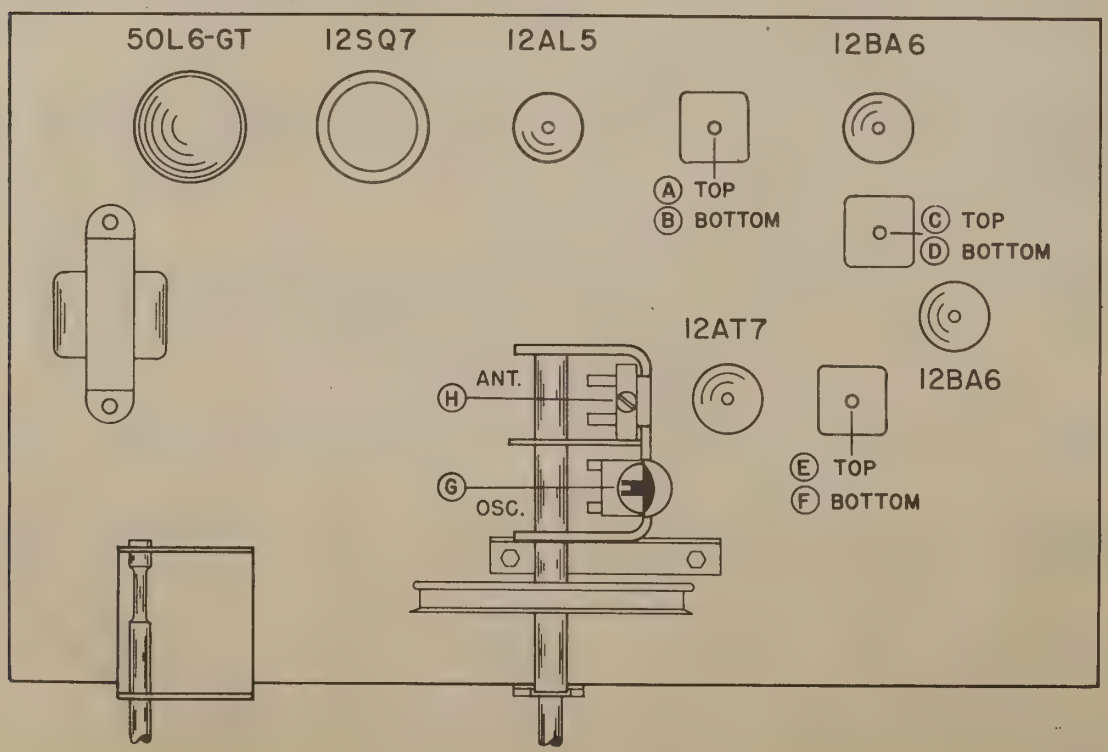


Fig. 4. Top View of Chassis Showing Location of Alignment Adjustments and Tubes

IF ALIGNMENT

- Use a 10.7 MC signal generator either amplitude modulated or unmodulated.
- Connect high side of generator through a .01 mfd. capacitor to pin 7 of V-1 (see Fig. 7) and low side to chassis.
- Adjust generator output to maintain approximately a one volt reading on the VTVM.
- Set VOLUME control at maximum.
- Refer to Fig. 4 for location of all alignment adjustments.

1. Connect a VTVM from pin 2 of V-4 (see Fig. 7) to the chassis. Adjust B, C, D, E and F for a maximum meter reading.
2. Connect two 470,000 ohm resistors in series from pin 2 of V-4 to the chassis. Connect the common lead of the VTVM to the center tap of the two resistors and the probe to the junction of R-10 and C-17. (Refer to the schematic diagram and Fig. 5.) Adjust A for a zero reading between a positive and negative peak. The two peaks should have approximately the same amplitude. If not, readjust B slightly.

RF ALIGNMENT

- Use a signal generator either amplitude modulated or unmodulated which covers 156 MC and 170 MC.
- Connect high side of generator through a 68 ohm resistor to A on antenna terminal strip on rear of chassis. Connect low side to G.
- Refer to Fig. 4 for location of alignment adjustments.
- Connect a VTVM from pin 2 of V-4 (see Fig. 7) to the chassis.
- Adjust the generator output to maintain approximately a one volt reading on the VTVM.
- Set VOLUME control at maximum.
- Use a non-metallic alignment tool.

1. Set the generator and receiver dial to 170 MC and adjust G and then H for maximum output. When adjusting H, rock the tuning capacitor slightly.
2. Check the calibration at the low end of the receiver by setting the generator and receiver dial to 156 MC. A calibration adjustment is usually not necessary and should not be made unless the oscillator coil on the top front of the tuning gang has been damaged or bent. If the adjustment is required, the frequency can be increased by squeezing the sides of the coil or decreased by spreading them apart slightly.
3. Repeat Step 1.

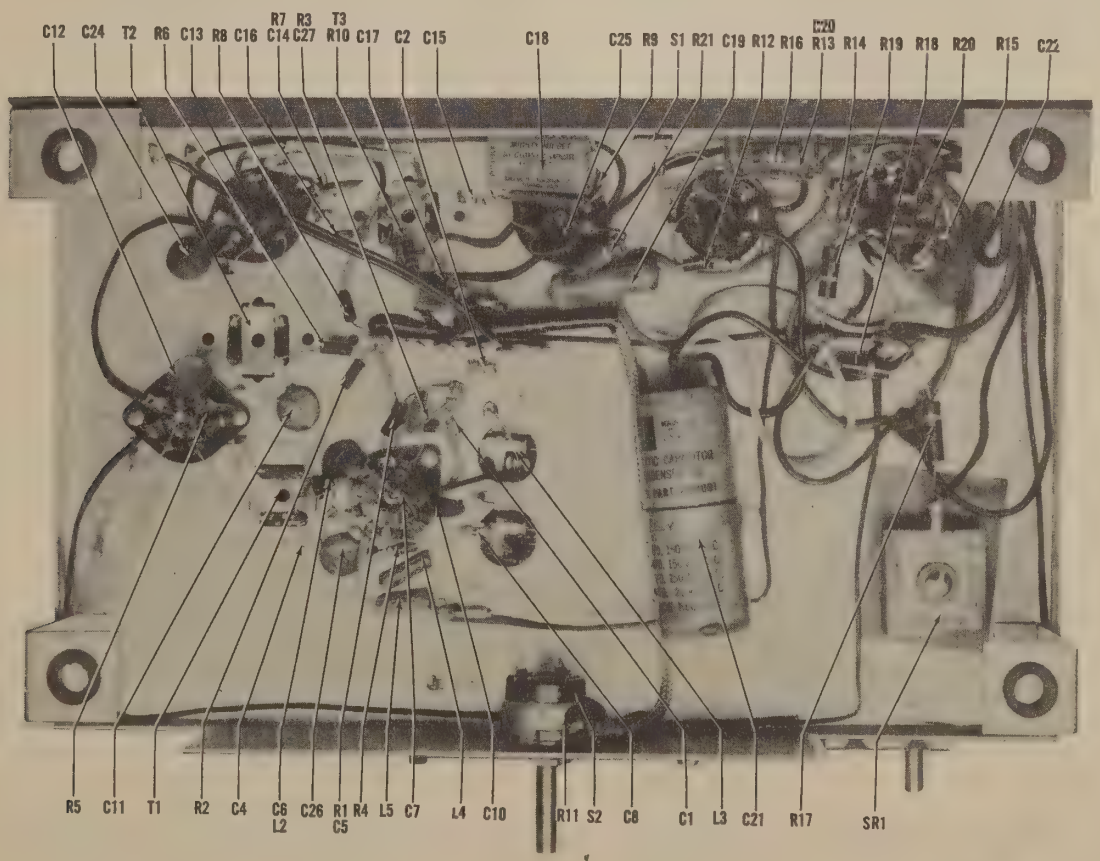


Fig. 5. Bottom View of Chassis Showing Component Location

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92X1401

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2	330 mmf. 500 V., ceramic	47B20331K5
C-3A & B	Tuning capacitor, 2 section	48C278
C-4	33 mmf. 500 V., ceramic	47X25C330J
C-5	.01 mfd. 450 V., ceramic disc	47A224
C-6,10,11, 12,13,14, 24,25,26,27	.005 mfd. 450 V., ceramic disc	47A168
C-7	.68 mmf. 500 V., bakelite	47A160-1
C-8	47 mmf. 500 V., ceramic	47X20UK470K
C-9	Trimmer, ceramic; 4-20 mmf.	44A115
C-15,16	100 mmf. 500 V., ceramic	47X25UK101K
C-17	1000 mmf. 500 V., ceramic	47B20102M5
C-18	2 mfd. 50 V., electrolytic	45B192
C-19,20	.01 mfd. 600 V., tubular paper	46AY103J
C-21A,B,C, & D	20 mfd. 25 V., 60-40-40 mfd. 150 V., electrolytic	45B091
C-22	.005 mfd. 600 V., tubular paper	46AY502J
C-23	.05 mfd. 600 V., tubular paper	46AY503J
	RESISTORS	
R-1,2,3,6,8	1000 ohms ½ watt, carbon	23X20X102K
R-4	10,000 ohms ½ watt, carbon	23X20X103K
R-5,7,16	100 ohms ½ watt, carbon	23X20X101K
R-9,10	47,000 ohms ½ watt, carbon	23X20X473K
R-11	VOLUME control, 2 megohms; includes switch S-2	25B896
R-12	2.2 megohms ½ watt, carbon	23X20X225K
R-13	270,000 ohms ½ watt, carbon	23X20X274K
R-14	470,000 ohms ½ watt, carbon	23X20X474K
R-15	150 ohms ½ watt, carbon	23X20X151K
R-17	22 ohms ½ watt, carbon	23X20X220K
R-18	220 ohms 1 watt, carbon	23X30X221K
R-19	470 ohms 1 watt, carbon	23X30X471K
R-20	47 ohms 2 watts, carbon	23X40X470K
R-21	270 ohms 1 watt, carbon	24BW271E
	COILS AND TRANSFORMERS	
L-1	Coil, antenna	51A1472
L-2	Choke, RF; wound on 4700 ohm resistor	53A239
L-3	Coil, oscillator	51A1471
L-4	Choke, RF; 2.2 microhenries	53A238
L-5	Choke, RF; 3.3 microhenries	53A239
T-1	Transformer, 1st IF	50C519
T-2	Transformer, 2nd IF	50C517
T-3	Transformer, ratio detector	50C518
T-4	Transformer, audio output	55A127

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1	Switch, SPEAKER-PHONES	60A243
S-2	Switch, OFF-ON; part of VOLUME control R-11	------
	TUBES AND RECTIFIERS	
V-1	12AT7: oscillator and mixer	90X12AT7
V-2,3	12BA6: 1st and 2nd IF amplifiers	90X12BA6
V-4	12AL5: ratio detector	90X12AL5
V-5	12SQ7: audio amplifier	90X12SQ7
V-6	50L6-GT: audio output	90X50L6-GT
SR-1	Selenium rectifier, 100 ma	27A161
	MISCELLANEOUS	
	Cabinet	66B764
	Cabinet back	32C509
	Clip, mtg.; for transformers T-1, 2 and 3	76A385
	Clip, push-on; for mounting dial window	76A853
	Cover, cabinet bottom	8C1617
	Dial cord, 31 inches	38A019
	Dial scale	83C404
	Foot, mounting; rubber	16A007
	Knob, TUNING control	15A048
	Knob, VOLUME control	15A049
	Grommet, rubber; chassis-cabinet insulating	16A201
	Insulator, nylon; fits in chassis-cabinet insulating grommet	4A647
PL-1	Line cord and plug	87A078
	Lock, line cord; male	76A397-1
	Lock, line cord; female	76A397-2
TS-2	PHONE jack strip	88A071
	Pointer, dial	82A207
	Shaft, tuning	74A494
	Socket, tube; octal	6A250
	Socket, tube; 7 pin miniature	6B402
	Socket, tube; 9 pin miniature	6A401
LS-1	Speaker, 5 inch PM	85C120
	Spring, dial cord	75A012
TS-1	Terminal strip, antenna	88A809
	Washer, extruded; chassis-cabinet insulating	4A646
	Window, dial	22B345

GENERAL DESCRIPTION

Your Hallicrafters Model S-81 is an FM receiver which covers the police, fire, taxicab, railroad, private telephone, forestry and other industrial services operating in the 152 to 173 megacycle communication band. It uses a selenium rectifier and 6 tubes in a superheterodyne circuit with a ratio detector and is designed to operate from 105 to 125 volt direct current (DC) or 50/60 cycle alternating current (AC).

The dial is calibrated for both frequency and type of service. Due to the close spacing of channel assignments in the frequency range of the receiver, it is not possible to indicate all of the services on the dial. However, a complete listing of the services covered by the receiver as well as their frequency assignments can be found on page 3. In some localities, all of the available channels are not being used at the present time.



92X1560

Model S-81 Civic Patrol

A 5-inch Alnico V permanent magnet speaker is mounted in the top of the cabinet. For headphone operation, tip jacks have been provided on the rear of the chassis to accommodate any standard 500 to 3000 ohm headphones. The speaker-headphones selector switch is on the rear of the chassis.

Services similar to those covered by the S-81 also operate in the 30 to 50 megacycle range. A companion receiver, the S-82, covers this range and is available from your Hallicrafters dealer.

To get the maximum enjoyment from your Hallicrafters receiver, carefully follow the instructions contained in this book.

INSTALLATION INSTRUCTIONS

UNPACKING - Check all shipping labels and tags for instructions before removing or destroying them.

LOCATION - The receiver is equipped with rubber feet for table top or shelf mounting. When locating the receiver, avoid excessively warm locations near radiators, hot air outlets, etc. Ventilation openings have been provided in the top and back of the cabinet. Care should be taken not to allow these holes to be covered or ventilation impeded in any way.

POWER SOURCE - The receiver is designed to operate from 50/60 cycle 105-125 volt alternating current (AC) or 105-125 volt direct current (DC). The power consumption is 30 watts. If in doubt about your power supply, call your power company before plugging in the receiver. A wrong power supply may cause damage to the receiver.

IMPORTANT - When operating on DC, reverse the power plug at the wall outlet if the receiver does not operate after a one minute warm up period.

Mobile operation of the receiver is easily possible by the use of a 6 volt DC to 110 volt AC power inverter such as Cornell-Dubilier Model 6R10 or American Television and Radio Model 6-RSC. Such a unit equips the receiver for operation from 6 volt battery sources normally found in automobiles, trucks, etc.

ANTENNA INSTALLATION - The terminals marked A and G on the back of the receiver are for antenna and ground connections. To facilitate antenna installation, a two foot antenna wire has been included with your receiver. This antenna vertically mounted will provide reception of signals over a distance of approximately 7 to 10 miles. If you are located farther from a transmitting station, an outside antenna may be required. The outside antenna may be either a vertical whip or vertical doublet. A doublet antenna can be easily constructed from standard 300 ohm twin-lead TV transmission line. (See Fig. 1.) Whip antennas such as Master Mobile Mounts Models 113 and 114 are suitable for both outdoor and mobile use.

INDOOR ANTENNA (Supplied with Receiver)

1. Uncoil the antenna wire which has been included with your receiver and connect one end of it to terminal A.

2. Erect the antenna wire so that the major portion is vertical. The antenna may be held in a vertical position by fastening it to the cabinet back with a piece of tape.

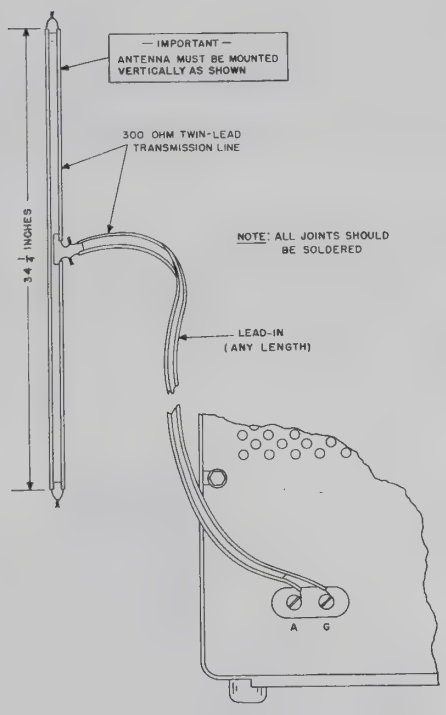
DOUBLET ANTENNA

1. Construct the antenna from a length of 300 ohm twin-lead transmission line as shown in Fig. 1.

2. All transmissions in the frequency range of the receiver are vertically polarized. For maximum signal pickup, the receiving antenna should also be similarly polarized. To properly polarize the doublet antenna, mount it so that length of the antenna is vertical.

3. The antenna should be erected as high as possible since the height of the antenna above ground determines the ability to pick up distant stations.

4. Use 300 ohm twin-lead transmission line as the lead-in from the antenna to the receiver. The lead-in should be run away at right angles to the antenna for at least 12 inches. At the receiver, connect the lead-in to terminals A and G.



92C1565-1

Fig. 1. Construction Details of the Doublet Antenna

OPERATING INSTRUCTIONS

To operate the receiver, perform the following simple steps:

1. Turn the receiver on by rotating the VOLUME control knob to the right. Allow about one minute for warm up. If the receiver fails to operate on DC, reverse the power plug at the wall outlet to obtain proper polarity.

2. Turn the VOLUME control knob to a well advanced position. This control will have to be reset for the desired volume level after a station has been tuned in.

3. Tune in the desired station by rotating the TUNING control knob slowly until the dial pointer indicates the station frequency. After the station is located, the pointer should be moved back and forth until the point of loudest and clearest reception is found.

4. Readjust the VOLUME control knob for the desired volume.

5. To turn the receiver off, turn the VOLUME control knob to the left until a click is heard.

***FREQUENCY ASSIGNMENTS OF SERVICES COVERED BY MODEL S-81**

Telephone - Base	Special Emergency	Forest Products Service	Power
152.51 - 152.81	157.47	153.05 - 153.35	153.41 - 153.71
152.03 - 152.2	159.51 - 161.99	158.31 - 158.43	158.13 - 158.25
Telephone - Mobile	**Police**	**Petroleum**	**Forestry**
157.77 - 158.07	154.65 - 156.7	153.05 - 153.35	156.87 - 156.93
158.49 - 158.67	158.73 - 161.7	158.31 - 158.43	159.27 - 159.51
			161.79
Taxicabs - Base & Mobile	**Fire**	**Highway Maintenance**	170.425 - 170.575
152.27 - 152.45	153.77 - 154.43	156.99 - 157.41	171.425 - 171.575
	159.51 - 161.79	159.51 - 161.79	172.225 - 172.375
Taxicabs - Mobile Only	166.25		
157.53 - 157.71	170.15	**Motion Picture**	**Railroad**
		152.87 - 152.99	159.51 - 161.91

* All frequencies in megacycles.

SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes and Rectifiers	6 tubes and 1 selenium rectifier
Speaker	5 inch PM
Voice Coil Impedance	3.2 ohms
Headphone Output Impedance	100 ohms
Antenna Input Impedance	72 ohms
Antenna	Vertically polarized whip or doublet (See Page 3)
Intermediate Frequency	10.7 MC
Power Supply	105-125 volts DC or 50-60 cycle AC
Frequency Coverage	152 to 173 MC

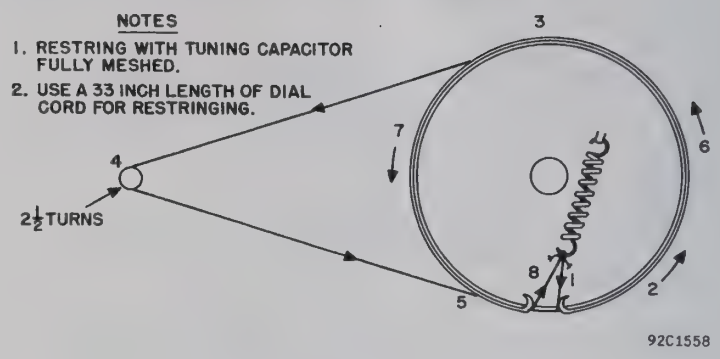


Fig. 2. Dial Cord Stringing Diagram

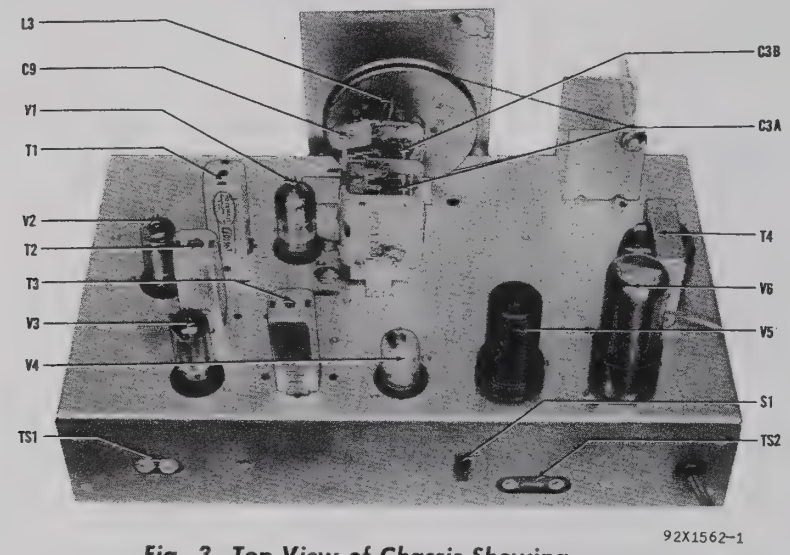


Fig. 3. Top View of Chassis Showing Component Location

TUBE REPLACEMENT - The tube types and their relative location in the receiver are shown in Fig. 4. Access to all tubes is possible by removing the cabinet back cover. When installing a replacement octal tube: (1) Insert the center guide pin of the tube into the center hole of the tube socket (2) Rotate the tube until the key on the guide pin drops into the notch in the socket hole and (3) Push down on the tube until the base of the tube rests firmly on the socket. When installing a replacement miniature tube, line up the seven pins on the tube with the socket holes before pushing the tube into place. Handle all tubes with care as they are fragile and will not withstand mechanical abuse.

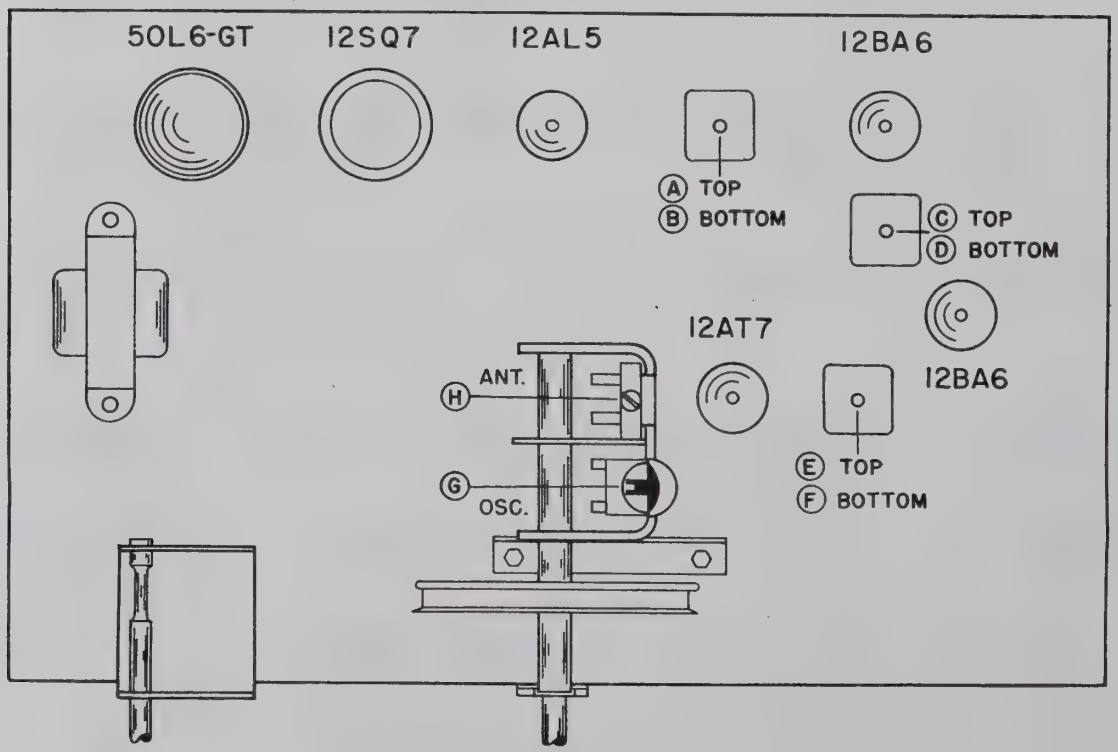


Fig. 4. Top View of Chassis Showing Location of Alignment Adjustments and Tubes

IF ALIGNMENT

- Use a 10.7 MC signal generator either amplitude modulated or unmodulated.
- Connect high side of generator through a .01 mfd. capacitor to pin 7 of V-1 (see Fig. 7) and low side to chassis.
- Adjust generator output to maintain approximately a one volt reading on the VTVM.
- Set VOLUME control at maximum.
- Refer to Fig. 4 for location of all alignment adjustments.

1. Connect a VTVM from pin 2 of V-4 (see Fig. 7) to the chassis. Adjust B, C, D, E and F for a maximum meter reading.
2. Connect two 470,000 ohm resistors in series from pin 2 of V-4 to the chassis. Connect the common lead of the VTVM to the center tap of the two resistors and the probe to the junction of R-10 and C-17. (Refer to the schematic diagram and Fig. 5.) Adjust A for a zero reading between a positive and negative peak. The two peaks should have approximately the same amplitude. If not, readjust B slightly.

RF ALIGNMENT

- Use a signal generator either amplitude modulated or unmodulated which covers 156 MC and 170 MC.
- Connect high side of generator through a 68 ohm resistor to A on antenna terminal strip on rear of chassis. Connect low side to G.
- Refer to Fig. 4 for location of alignment adjustments.
- Connect a VTVM from pin 2 of V-4 (see Fig. 7) to the chassis.
- Adjust the generator output to maintain approximately a one volt reading on the VTVM.
- Set VOLUME control at maximum.
- Use a non-metallic alignment tool.

1. Set the generator and receiver dial to 170 MC and adjust G and then H for maximum output. When adjusting H, rock the tuning capacitor slightly.
2. Check the calibration at the low end of the receiver by setting the generator and receiver dial to 156 MC. A calibration adjustment is usually not necessary and should not be made unless the oscillator coil on the top front of the tuning gang has been damaged or bent. If the adjustment is required, the frequency can be increased by squeezing the sides of the coil or decreased by spreading them apart slightly.
3. Repeat Step 1.

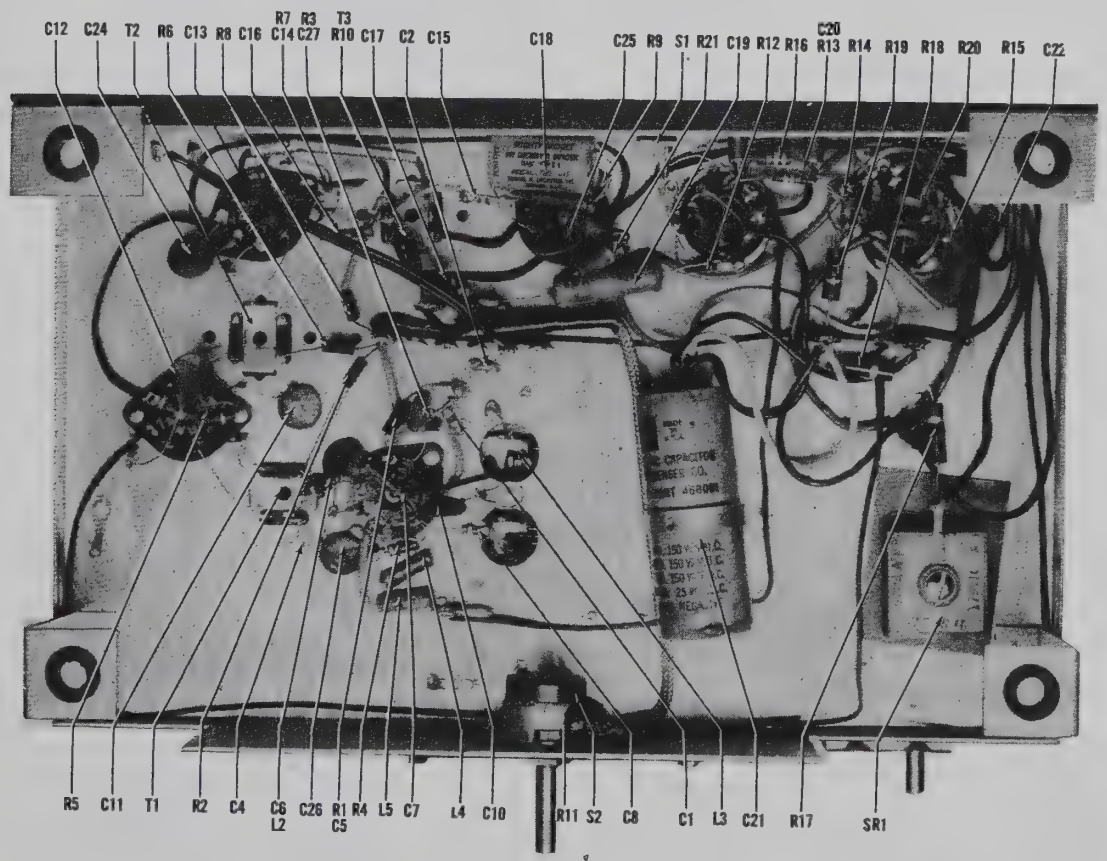


Fig. 5. Bottom View of Chassis Showing Component Location

92X1561

SERVICE OR OPERATING QUESTIONS - For further information regarding operation or servicing of the receiver, contact your dealer. Make no service shipments to the factory as the Hallicrafters Co. will not accept the responsibility for unauthorized shipments. Factory type service is available at any HALLICRAFTERS AUTHORIZED SERVICE CENTER which displays the sign shown at the right. For the location of the SERVICE CENTER nearest you, consult your dealer or telephone directory.



The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

92X1401

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2	330 mmf. 500 V., ceramic	47B20331K5
C-3A & B	Tuning capacitor, 2 section	48C278
C-4	33 mmf. 500 V., ceramic	47X25C330J
C-5	.01 mfd. 450 V., ceramic disc	47A224
C-6,10,11, 12,13,14, 24,25,26,27	.005 mfd. 450 V., ceramic disc	47A168
C-7	.68 mmf. 500 V., bakelite	47A160-1
C-8	47 mmf. 500 V., ceramic	47X20UK470K
C-9	Trimmer, ceramic; 4-20 mmf.	44A115
C-15,16	100 mmf. 500 V., ceramic	47X25UK101K
C-17	1000 mmf. 500 V., ceramic	47B20102M5
C-18	2 mfd. 50 V., electrolytic	45B192
C-19,20	.01 mfd. 600 V., tubular paper	46AY103J
C-21A,B,C, & D	20 mfd. 25 V., 60-40-40 mfd. 150 V., electrolytic	45B091
C-22	.005 mfd. 600 V., tubular paper	46AY502J
C-23	.05 mfd. 600 V., tubular paper	46AY503J
	RESISTORS	
R-1,2,3,6,8	1000 ohms ½ watt, carbon	23X20X102K
R-4	10,000 ohms ½ watt, carbon	23X20X103K
R-5,7,16	100 ohms ½ watt, carbon	23X20X101K
R-9,10	47,000 ohms ½ watt, carbon	23X20X473K
R-11	VOLUME control, 2 megohms; includes switch S-2	25B896
R-12	2.2 megohms ½ watt, carbon	23X20X225K
R-13	270,000 ohms ½ watt, carbon	23X20X274K
R-14	470,000 ohms ½ watt, carbon	23X20X474K
R-15	150 ohms ½ watt, carbon	23X20X151K
R-17	22 ohms ½ watt, carbon	23X20X220K
R-18	220 ohms 1 watt, carbon	23X30X221K
R-19	470 ohms 1 watt, carbon	23X30X471K
R-20	47 ohms 2 watts, carbon	23X40X470K
R-21	270 ohms 1 watt, carbon	24BW271E
	COILS AND TRANSFORMERS	
L-1	Coil, antenna	51A1472
L-2	Choke, RF; wound on 4700 ohm resistor	53A239
L-3	Coil, oscillator	51A1471
L-4	Choke, RF; 2.2 microhenries	53A238
L-5	Choke, RF; 3.3 microhenries	53A239
T-1	Transformer, 1st IF	50C519
T-2	Transformer, 2nd IF	50C517
T-3	Transformer, ratio detector	50C518
T-4	Transformer, audio output	55A127

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S-1	Switch, SPEAKER-PHONES	60A243
S-2	Switch, OFF-ON; part of VOLUME control R-11	------
	TUBES AND RECTIFIERS	
V-1	12AT7: oscillator and mixer	90X12AT7
V-2,3	12BA6: 1st and 2nd IF amplifiers	90X12BA6
V-4	12AL5: ratio detector	90X12AL5
V-5	12SQ7: audio amplifier	90X12SQ7
V-6	50L6-GT: audio output	90X50L6-GT
SR-1	Selenium rectifier, 100 ma	27A161
	MISCELLANEOUS	
	Cabinet	66B764
	Cabinet back	32C509
	Clip, mtg.; for transformers T-1, 2 and 3	76A385
	Clip, push-on; for mounting dial window	76A853
	Cover, cabinet bottom	8C1617
	Dial cord, 31 inches	38A019
	Dial scale	83C404
	Foot, mounting; rubber	16A007
	Knob, TUNING control	15A048
	Knob, VOLUME control	15A049
	Grommet, rubber; chassis-cabinet insulating	16A201
	Insulator, nylon; fits in chassis-cabinet insulating grommet	4A647
PL-1	Line cord and plug	87A078
	Lock, line cord; male	76A397-1
	Lock, line cord; female	76A397-2
TS-2	PHONE jack strip	88A071
	Pointer, dial	82A207
	Shaft, tuning	74A494
	Socket, tube; octal	6A250
	Socket, tube; 7 pin miniature	6B402
	Socket, tube; 9 pin miniature	6A401
LS-1	Speaker, 5 inch PM	85C120
	Spring, dial cord	75A012
TS-1	Terminal strip, antenna	88A809
	Washer, extruded; chassis-cabinet insulating	4A646
	Window, dial	22B345

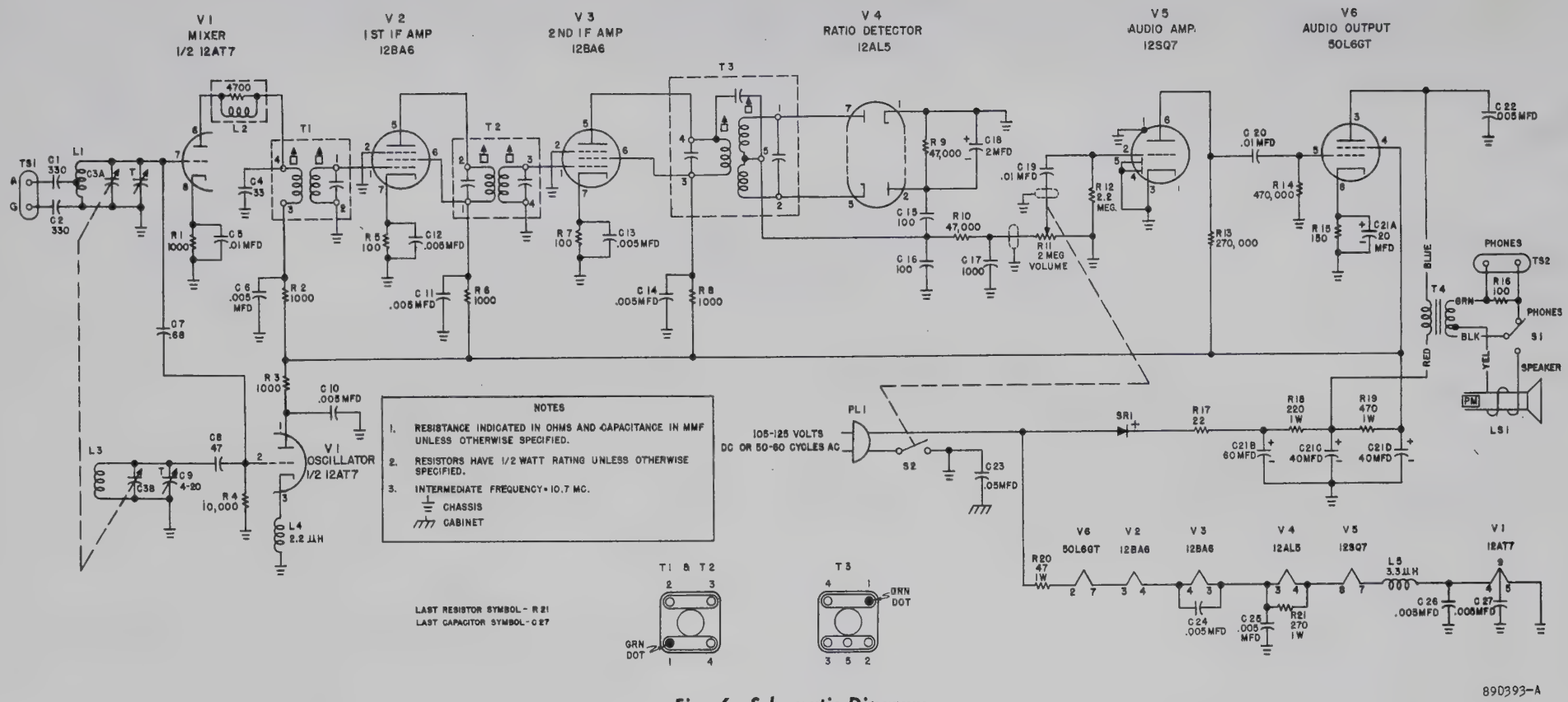


Fig. 6. Schematic Diagram

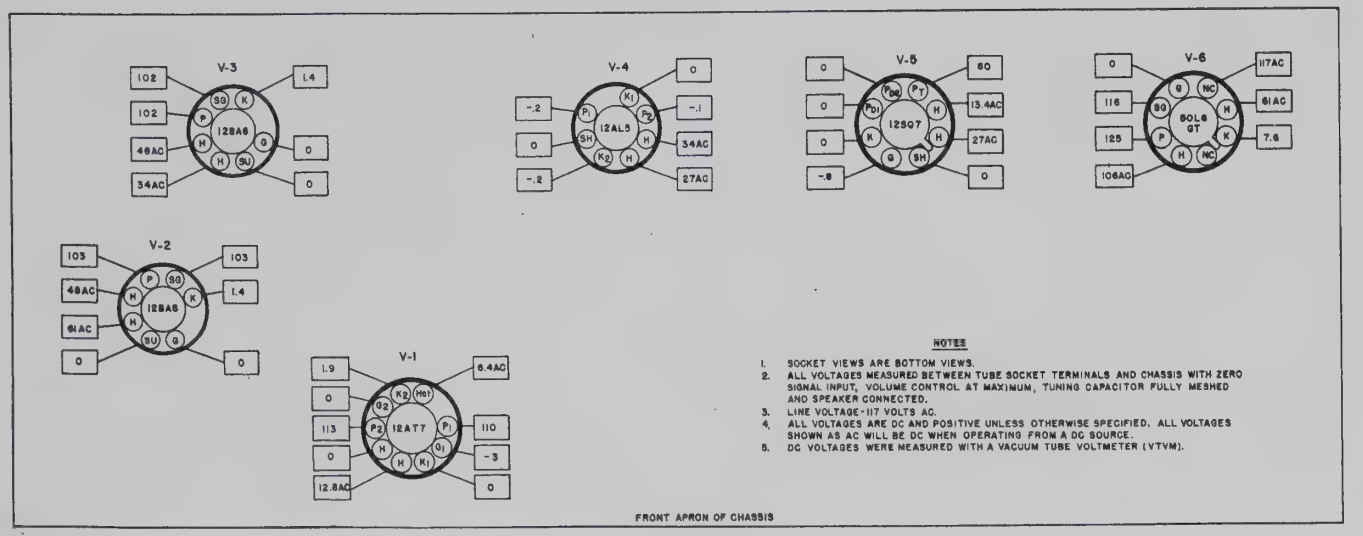


Fig. 7. Tube Socket Voltage Chart

9201557

MODEL S-81
RUN 1

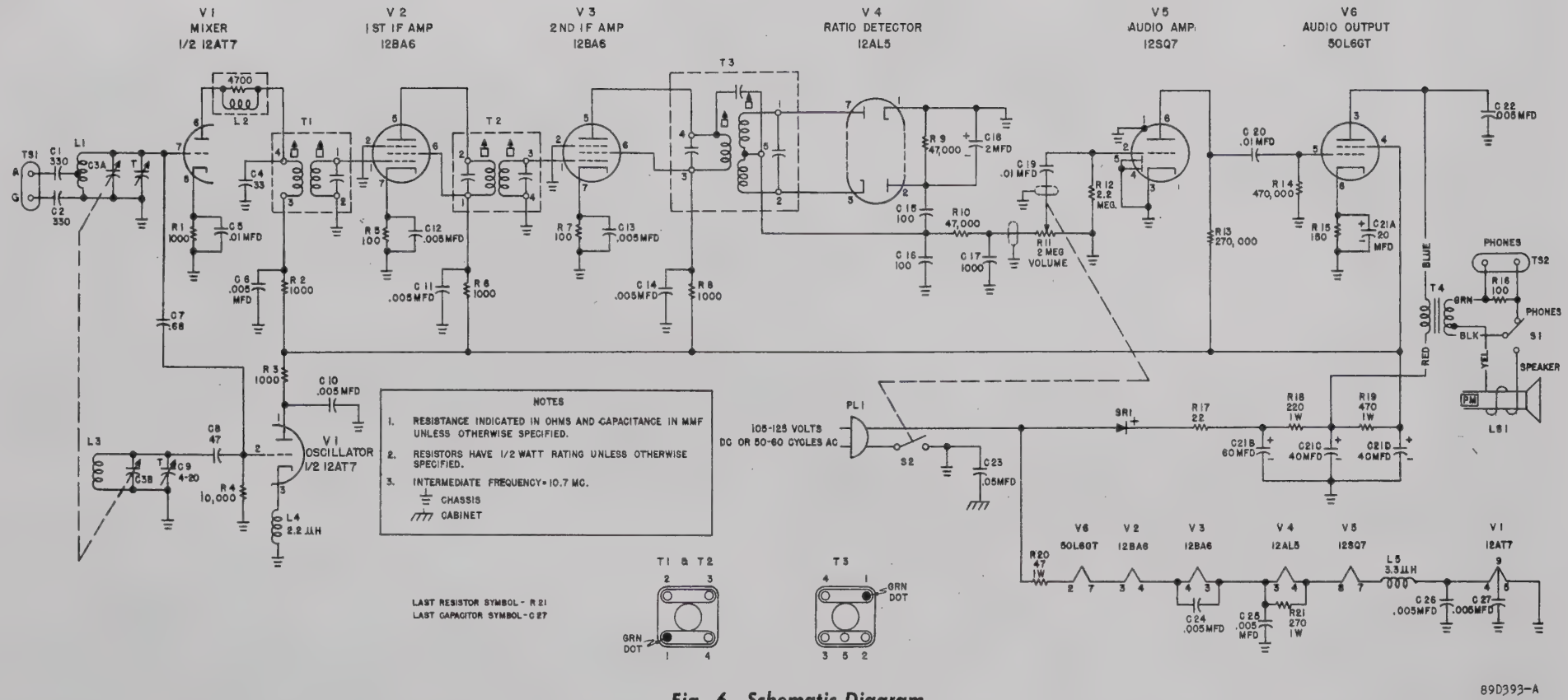


Fig. 6. Schematic Diagram

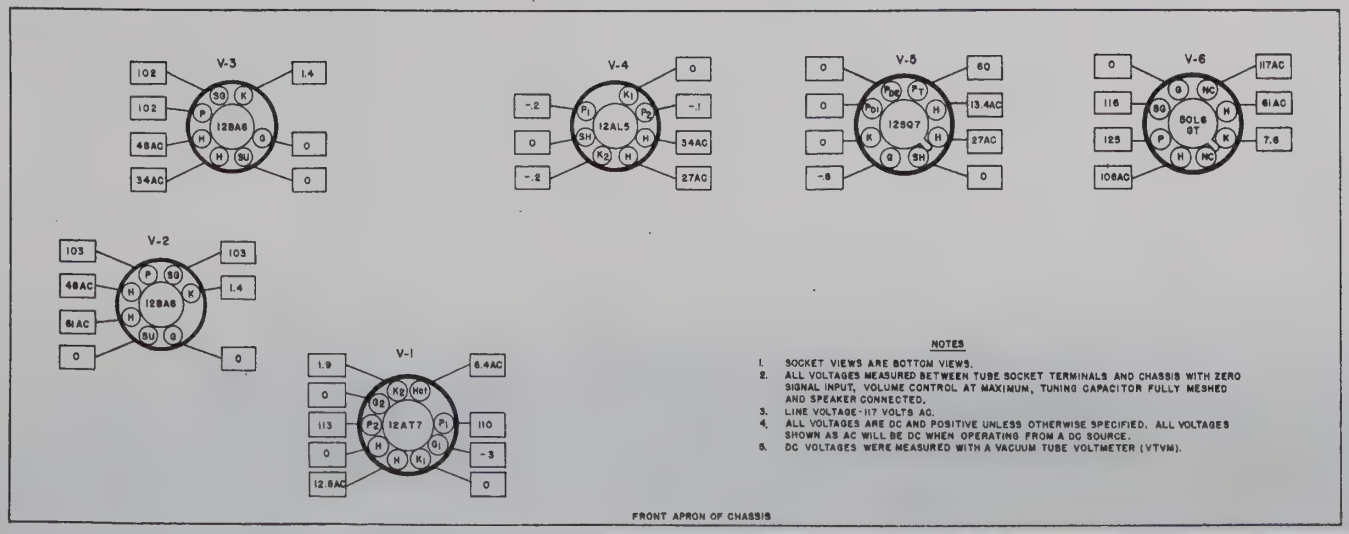


Fig. 7. Tube Socket Voltage Chart

92D1557

MODEL S-81
RUN 1

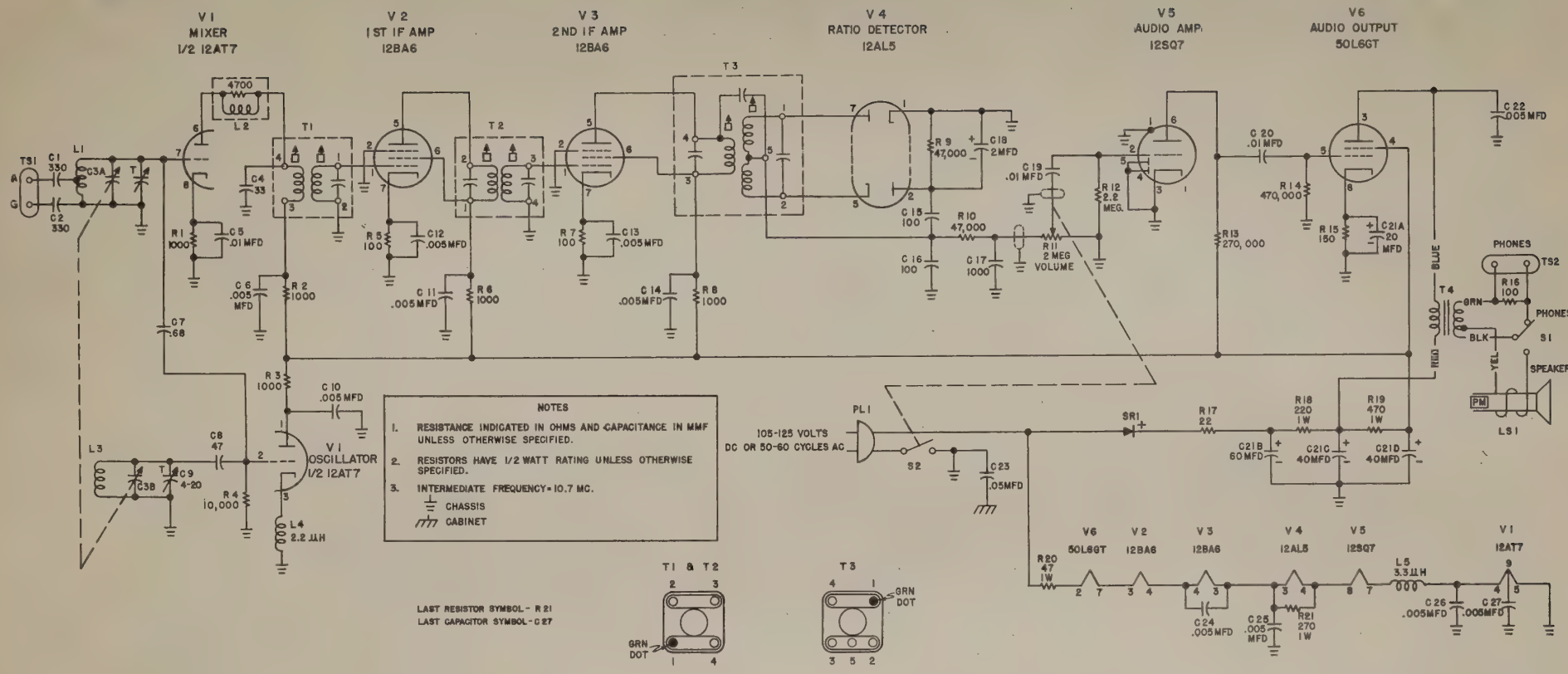


Fig. 6. Schematic Diagram

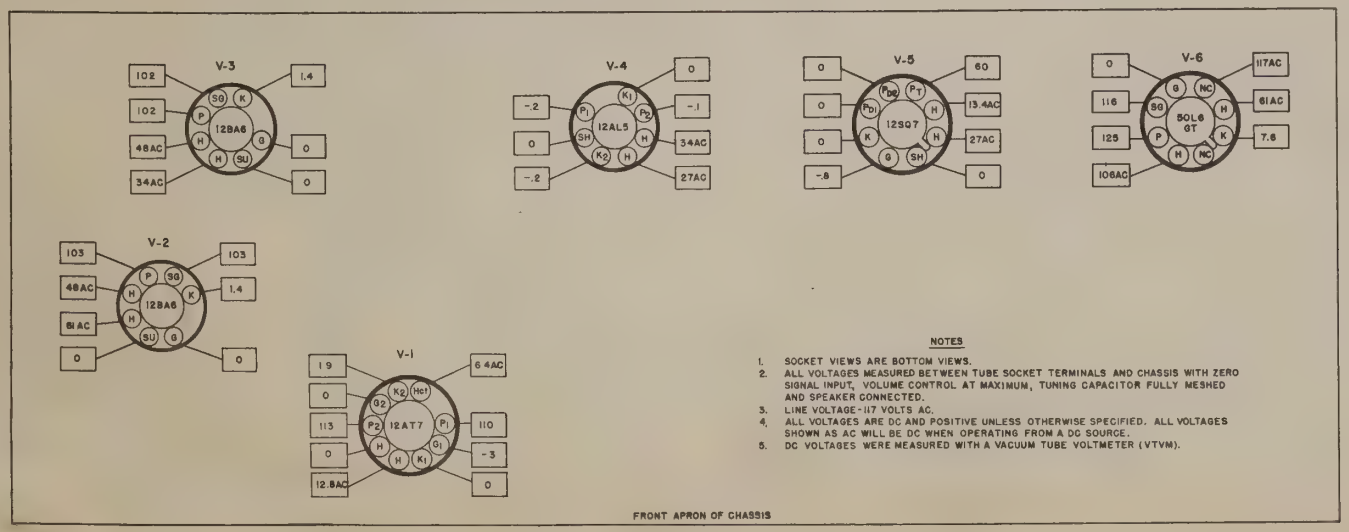


Fig. 7. Tube Socket Voltage Chart

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X823
10-51—RUN 1



S-95

RUN 1

the hallicrafters co.

MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

GENERAL DESCRIPTION

Your new Hallicrafters Model S-95 is an FM receiver which covers the police, fire, taxicab, bus, railroad, private telephone, forestry and other industrial services operating in the 152 to 173 megacycle communication band. It employs 8 tubes and a selenium rectifier in the latest type superheterodyne circuit and is designed to operate on 105 to 125 volt AC or DC current. Mobile operation is also possible by using a 6-volt DC to 110-volt AC power converter. (See "Power Source" below.) Quick and easy operation is afforded by the modern easy-to-read dial and a minimum of controls. A special logging scale on the dial assures ease and accuracy in logging or relocating stations of special interest. During periods when no signal is being received, the receiver may be completely silenced by the built-in adjustable relay-type squelch system. Satisfactory reception is usually possible without an outside antenna or ground and, in most localities, fine performance can be obtained with just the 2-foot antenna wire included with your receiver.

Services similar to those covered by the S-95 Receiver also operate in the 30 to 50 megacycle communication band. A companion receiver, the Model S-94, covers this frequency range and is available from your Hallicrafters dealer.



Fig. 1. Model S-95

INSTALLATION

UNPACKING - After unpacking the receiver, examine it closely for damage which may have occurred in transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for instructions before removing or destroying them.

LOCATION- The receiver is equipped with rubber feet for table or shelf mounting. When locating the receiver, avoid excessively warm locations such as those near radiators and heating vents. Allow at least an inch of clearance between the back of the receiver and the wall for proper ventilation.

POWER SOURCE - The receiver is designed to operate on 105 to 125 volt AC or DC current. If in doubt about your power source, contact your local power company before plugging in the receiver. The power consumption of the receiver is 40 watts.

Mobile operation is possible by the use of a 6-volt DC to 110-volt AC power converter such as Cornell Dubilier Model 6R10, American Television and Radio Model 6-RSD, or Terado Model 6-51160. Such units equip the receiver for operation from 6-volt battery sources normally found in automobiles, trucks, etc.

HEADPHONES - Two tip jacks, marked "Phones", are provided at the rear of the receiver for connecting headphones. The headphone output impedance is not critical and any commercial headphones may be used. For maximum headphone output, the use of low-impedance headphones is recommended. For headphone operation, the Speaker-Phones selector switch at the rear of the receiver should be set at "Phones".

ANTENNAS - The r-f input of the receiver is designed to operate from either a whip or vertical doublet antenna. Antenna connections are made to a two-terminal strip at the rear of the receiver marked "A" and "G".

Whip Antenna (Supplied with Receiver)

Where signal strength is not a problem, the 2-foot antenna wire included with your receiver will provide satisfactory results. It is simply necessary to uncoil this wire, connect one end of it to terminal "A", and then erect it vertically by fastening it to the back of the cabinet with a piece of tape. In some locations, reception may be improved by connecting a ground wire (ordinary copper wire) from terminal "G" to a cold water pipe or outside ground rod.

Vertical Doublet Antenna

For top performance, especially when receiving weak distant signals, the use of a vertical doublet antenna is recommended. Such an antenna may be readily constructed from standard 300-ohm twin-lead TV transmission line as shown in Fig. 2 and may be mounted either indoors or outdoors. For optimum performance, the doublet antenna should be cut to the proper length for the most used frequency or band of frequencies and erected as high as possible. The overall length of the doublet antenna is determined by the following formula:

$$\text{Length in inches} = \frac{5620}{\text{Frequency in megacycles}}$$

IMPORTANT: All transmissions in the frequency range of the receiver are vertically polarized and for maximum signal pickup, the receiving antenna should also be similarly polarized. This is accomplished by erecting the antenna so that its length is vertical as shown in Fig. 2.

OPERATION

1. Connect the power cord to a 105 to 125 volt, AC or DC power source.

2. Connect a suitable antenna to the antenna terminals at the rear of the receiver. See page 2 for antenna installation instructions.

3. Set the Speaker-Phones selector switch at the rear of the receiver at "Speaker".

4. Turn the receiver on by rotating the Volume control clockwise. Allow about one minute for the tubes to warm up. If the receiver fails to operate on DC, reverse the power plug to obtain proper polarity. On DC, the receiver will operate only with the plug in one position.

5. Set the Squelch control at "Off", set the Volume control at a well advanced position, and carefully tune in a desired signal with the Tuning control. After the signal has been accurately tuned in, reset the Volume control as desired.

   IMPORTANT: Always set the Squelch control at "Off" when tuning the receiver.

6. Turn the squelch circuit "on" by rotating the Squelch control clockwise just beyond the point where the switch "click" is heard. With the signal tuned in, slowly advance the Squelch control until the signal just disappears .... then turn in the opposite direction until the signal is heard again. This is the proper setting of the Squelch control. Setting the Squelch control farther clockwise than necessary will increase the minimum signal level necessary to "unsquelch" or activate the receiver. The Squelch control should be readjusted each time a signal is tuned in.

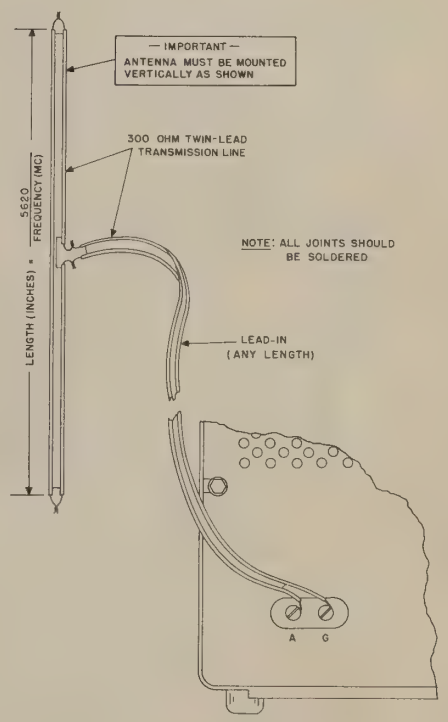


Fig. 2. Vertical Doublet Antenna

NOTE: If the signal disappears when the Squelch control is turned "on", it is an indication that the signal is not strong enough to properly operate the squelch circuit. When this occurs, simply operate the receiver with the squelch circuit disabled (Squelch control set at "Off").

7. To turn the receiver off, rotate the Volume control fully counterclockwise, until a click is heard.

***FREQUENCY ASSIGNMENTS OF SERVICES COVERED BY MODEL S-95**

Telephone - Base	Special Emergency	Forest Products Service	Power
152.51 - 152.81	157.47	153.05 - 153.35	153.41 - 153.71
152.03 - 152.2	159.51 - 161.99	158.31 - 158.43	158.13 - 158.25
Telephone - Mobile	**Police**	**Petroleum**	**Forestry**
157.77 - 158.07	154.65 - 156.7	153.05 - 153.35	156.87 - 156.93
158.49 - 158.67	158.73 - 161.7	158.31 - 158.43	159.27 - 159.51
			161.79
			170.425 - 170.575
Taxicabs - Base & Mobile	**Fire**	**Highway Maintenance**	171.425 - 171.575
152.27 - 152.45	153.77 - 154.43	156.99 - 157.41	172.225 - 172.375
	159.51 - 161.79	159.51 - 161.79	
	166.25		
Taxicabs - Mobile Only	170.15		**Railroad**
157.53 - 157.71		**Motion Picture**	159.51 - 161.91
		152.87 - 152.99	

* All frequencies in megacycles.

SERVICE INSTRUCTIONS

SPECIFICATIONS

Tubes and Rectifiers	8 tubes and 1 selenium rectifier
Speaker	5 inch PM
Voice Coil Impedance	3.2 ohms
Headphone Output Impedance	100 ohms
Antenna Input Impedance	300 ohms
Antenna	Vertically polarized whip or doublet (See Page 2)
Intermediate Frequency	10.7 MC
Power Supply	105-125 volts DC or 50-60 cycle AC
Frequency Coverage	152 to 173 MC

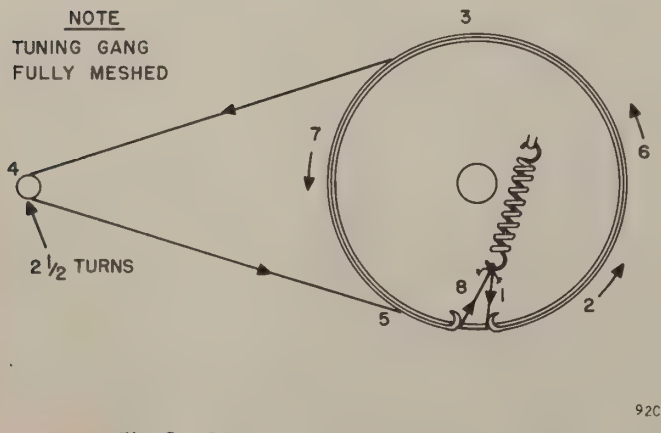


Fig. 3. Dial Cord Stringing Diagram.

SQUELCH RANGE CONTROL ADJUSTMENT

The Squelch Range control (Fig. 4) adjusts the operating point of the output section of the 12AU7 squelch tube (V-8). This control has been carefully adjusted at the factory for proper operation and will normally not require readjustment unless the squelch tube, relay, or components in the squelch circuit have been replaced. If adjustment is necessary, proceed as follows:

1. Connect a DC milliammeter (0-15 ma) in series with the squelch relay, RY-1, in the plate circuit of the squelch tube, V-8.

2. Set the Volume control at maximum, the Squelch Range control fully clockwise (minimum resistance) and the Squelch control on the front panel fully counterclockwise (maximum resistance) but not at "Off".

3. Tune the receiver to noisy part of the band where no signal is present.

4. With no signal tuned in, slowly rotate the Squelch Range control counterclockwise until the noise is just squelched (disappears). At this point the relay contacts are closed and the grid of the audio output tube is shorted to ground. Note the plate current reading of the squelch tube (should be anywhere from 6.5 to 10.25 ma), and then continue to advance the Squelch Range control until the plate current drops 2 ma from that obtained at the point of squelch. This is the proper setting of the Squelch Range control.

   If a milliammeter is not available, the Squelch Range control can be "roughly" set by adjusting the Squelch Range control to the point of squelch as outlined above and then advancing the control 65° farther counterclockwise.

IF ALIGNMENT

- Use a 10.7 MC signal generator, either amplitude modulated or unmodulated.
- Connect high side of generator through a .01 mfd. capacitor to pin 7 of V-2; connect low side to chassis.
- Adjust generator output to maintain a one volt reading on VTVM.
- Set Volume control at maximum and Squelch control at "Off".
- See Fig. 4 for location of alignment adjustments.

1. Connect DC probe of VTVM to pin 2 of V-5; common lead to chassis. Adjust B, C, D, E, and F for maximum output.
2. Connect two 470,000 ohm resistors in series between pin 2 of V-5 and the chassis. Connect DC probe of VTVM to junction of R-10 and C-16; common lead to center tap of the two 470,000 ohm resistors. Adjust A for zero reading between a positive and negative peak. The two peaks should have approximately the same amplitude. If not, readjust B slightly and then touch up A.

RF ALIGNMENT

- Use a signal generator either amplitude modulated or unmodulated which covers 156 MC and 170 MC.
- Connect high side of generator through a 270 ohm resistor to terminal "A" on antenna terminal strip on rear of chassis; low side to terminal "G".
- Use a non-metallic alignment tool.
- Connect DC probe of VTVM to pin 2 of V-5; common lead to chassis.
- Adjust generator output to maintain a one volt reading on VTVM.
- Set Volume control at maximum and Squelch control at "Off".
- See Fig. 4 for location of alignment adjustments.

1. Set generator and receiver dial to 170 MC and adjust G and then H for maximum output. When adjusting H, "rock" tuning capacitor slightly.
2. Check calibration at low end of receiver by setting generator and receiver dial to 156 MC. A calibration adjustment is usually not necessary and should not be made unless the oscillator coil on the top front of the tuning gang has been damaged or bent. If adjustment is required, the frequency can be increased by compressing the coil or decreased by expanding the coil.

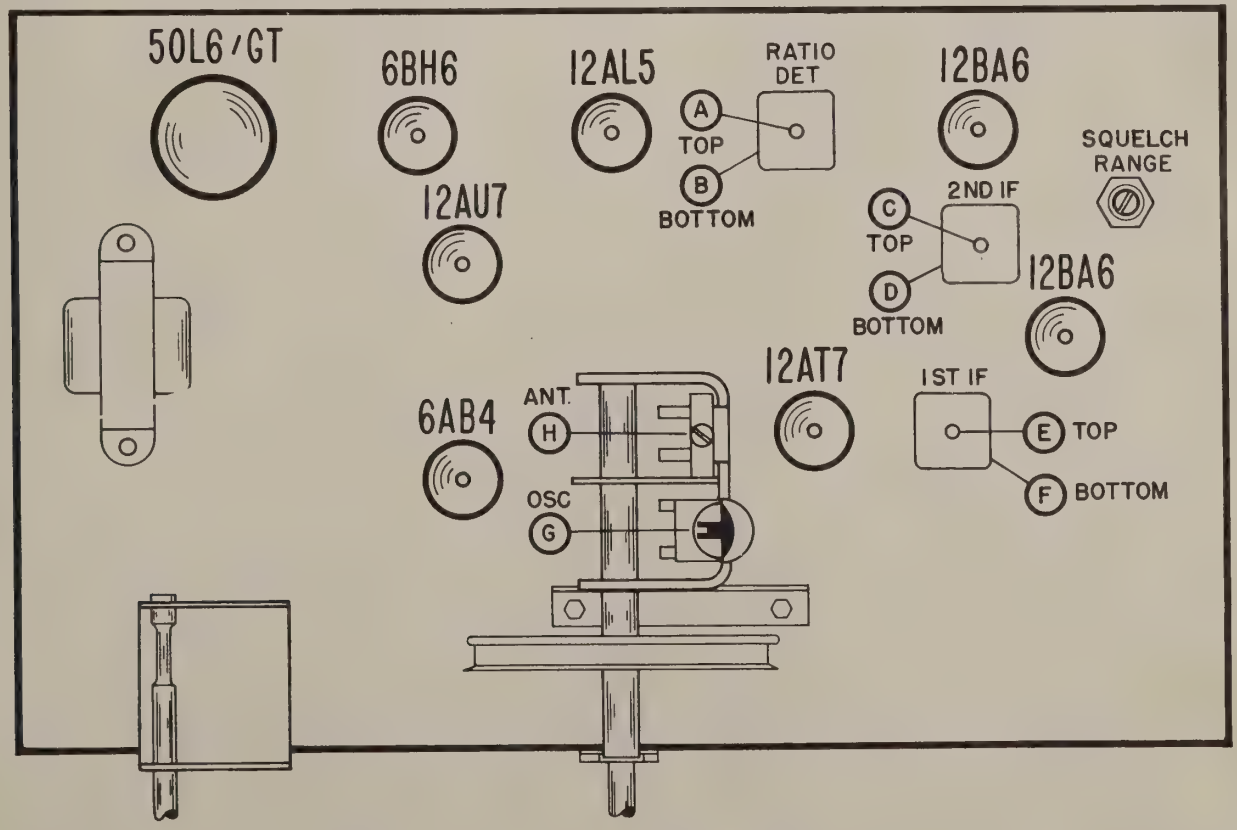


Fig. 4. Tube Location and Alignment Adjustments

SERVICE OR OPERATING QUESTIONS - For any further information regarding operation or servicing of your receiver, contact your Hallicrafters dealer. The Hallicrafters Co. maintains an extensive system of authorized service centers where any required service will be performed promptly and efficiently at a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown at the right. For the location of the one nearest you, consult your dealer or telephone directory.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



SERVICE PARTS LIST

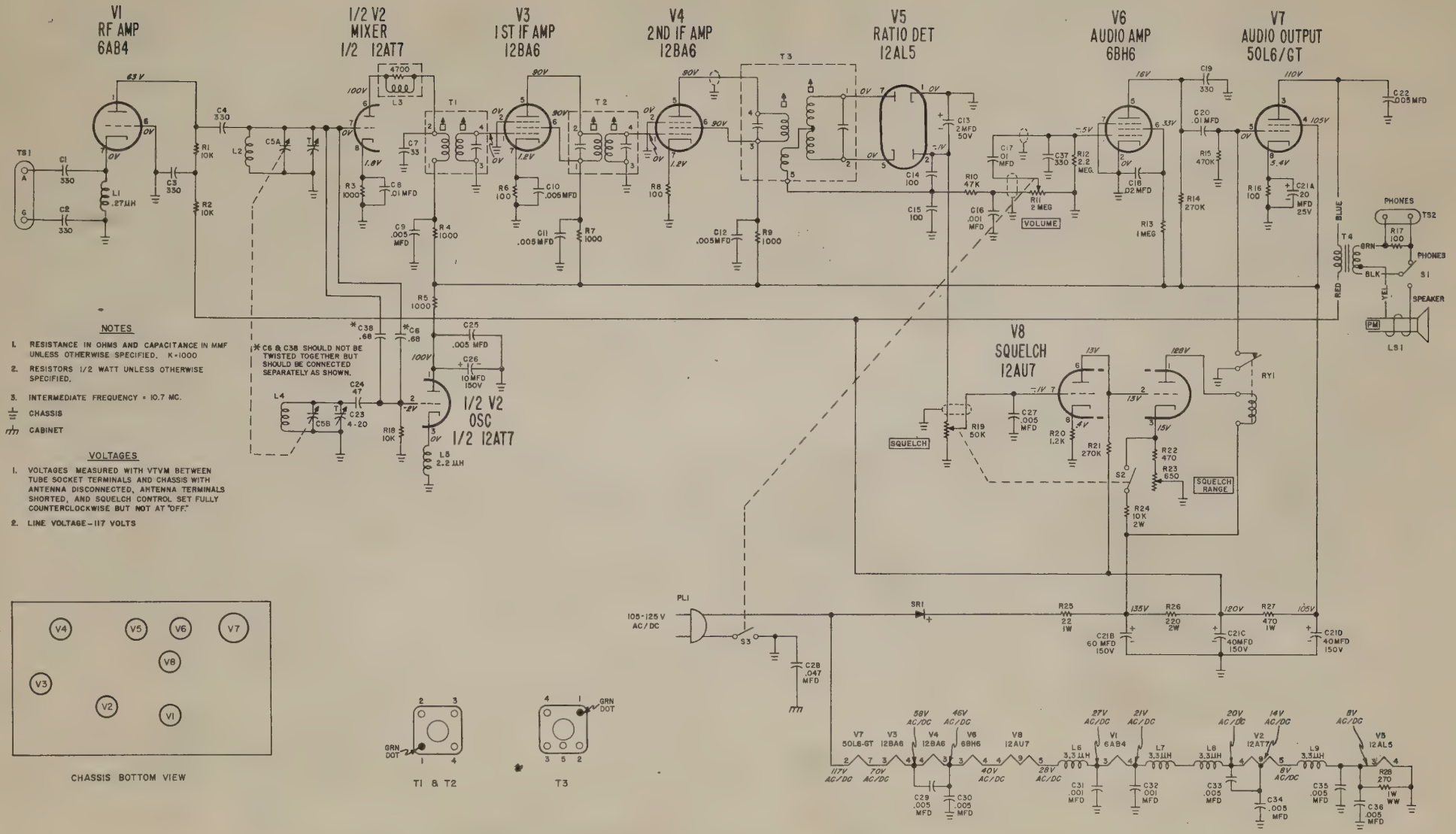
92X1401-C

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1,2,3,4,19, 37	330 mmfd. 10%, 500 V.; ceramic	47CA25331K5
C-5	Tuning capacitor, 2 section	48C278
C-6,38	0.68 mmfd. 20%, 500 V.; ceramic	47B403-1
C-7	33 mmfd. 5%, 500 V.; ceramic	47X25CJ330J
C-8,17,20	0.01 mfd. + 80-20%, 450 V.; ceramic disc	47A224
C-9,10,11,12, 22,25,27,29, 30,33,34,35,36	0.005 mfd. GMV, 500 V.; ceramic disc	47A168
C-13	2 mfd. 50 V., electrolytic	45B192
C-14,15	100 mmfd. 10%, 500 V.; ceramic	47X25UK101K
C-16,31,32	0.001 mfd. GMV, 500 V.; ceramic disc	47B230
C-18	0.02 mfd. + 80-20%, 500 V.; ceramic disc	47A242
C-21	60-40-40 mfd. @ 150 V., 20 mfd. @ 25 V.; electrolytic	45B091
C-23	4-20 mmfd., ceramic trimmer	44A115
C-24	47 mmfd. 10%, 500 V.; ceramic	47X20UK470K
C-26	10 mfd. 150 V., electrolytic	45C097
C-28	0.047 mfd. 600 V., molded tubular paper	46BR473L6

GMV - Guaranteed Minimum Value

	RESISTORS	
R-1,2,18	10,000 ohms 10%, 1/2 watt; carbon	23X20X103K
R-3,4,5,7,9	1000 ohms 10%, 1/2 watt; carbon	23X20X102K
R-6,8,16,17	100 ohms 10%, 1/2 watt; carbon	23X20X101K
R-10	47,000 ohms 10%, 1/2 watt; carbon	23X20X473K
R-11	2 megohms, variable; Volume control (includes power on-off switch)	25B1115
R-12	2.2 megohms 10%; 1/2 watt; carbon	23X20X225K
R-13	1 megohm 10%, 1/2 watt; carbon	23X20X105K
R-14,21	270,000 ohms 10%, 1/2 watt; carbon	23X20X274K
R-15	470,000 ohms 10%, 1/2 watt; carbon	23X20X474K
R-19	50,000 ohms, variable; Squelch control (includes squelch on-off switch)	25B1114
R-20	1200 ohms 10%, 1/2 watt; carbon	23X20X122K
R-22	470 ohms 10%, 1/2 watt; carbon	23X20X471K
R-23	650 ohms 1 watt, wirewound variable; Squelch Range control	25A1113
R-24	10,000 ohms 10%, 2 watt; carbon	23X40X103K
R-25	15 ohms 10%, 1/2 watt; carbon	20X150K
R-26	220 ohms 10%, 2 watt; carbon	23X40X221K
R-27	470 ohms 10%, 1 watt; carbon	23X30X471K
R-28	270 ohms 10%, 1 watt; wirewound	23X30X271K

	COILS AND TRANSFORMERS	
L-1	Coil, antenna	51A1894
L-2	Coil, RF	51A1472
L-3	Choke, RF; wound on 4700 ohm resistor	53A239
L-4	Coil, oscillator	51A1471
L-5	Choke, RF; 2.2 uh	53A238
L-6,7,8,9	Choke, RF; 3.3 uh	53A240
T-1	Transformer, 1st IF	50C519
T-2	Transformer, 2nd IF	50C517
T-3	Transformer, ratio detector	50C518
T-4	Transformer, audio output	55A127
	SWITCHES	
S-1	Switch, spst; Speaker-Phones	60A243
S-2	Switch, squelch on-off; part of Squelch control R-19	-------
S-3	Switch, power on-off; part of Volume control R-11	-------
	TUBES AND RECTIFIERS	
V-1	6AB4: RF amplifier	90X6AB4
V-2	12AT7: oscillator/mixer	90X12AT7
V-3,4	12BA6: 1st and 2nd IF amplifiers	90X12BA6
V-5	12AL5: ratio detector	90X12AL5
V-6	6BH6: audio amplifier	90X6BH6
V-7	50L6GT: audio output	90X50L6GT
V-8	12AU7: squelch	90X12AU7
SR-1	Selenium rectifier, 150 ma	27-158
	MISCELLANEOUS	
	Cabinet	40C173
	Cabinet back	32C680
	Clip, mtg.; for transformers T-1, 2 and 3	76A385
	Clip, push-on; for mounting dial window	76A853
	Cover, cabinet bottom	8C1617
	Dial	83C404
	Dial cord (specify length)	38A026
	Foot, mounting; rubber	16A007
	Grommet, rubber; chassis-cabinet insulating	16A201
	"h" medallion	7A021
	Insulator, nylon; fits in chassis-cabinet insulating grommet	4A647
	Knob, Tuning control	15B802
	Knob, Volume and Squelch controls	15B816
PL-1	Line cord and plug	87A078
	Lock, line cord male section	76A397-1
	female section	76A397-2
	Pointer, dial	82A277
	Relay, DC; spst normally closed; 1000 ohms DC, 8-11 ma pull-in.	21B193
	Ring, retaining; "E" type	76A1052
	Socket, tube, 7-pin miniature	6B402
	9-pin miniature	6A401
	octal	6A250
	Speed nut (for mounting "h" medallion	2A1011
LS-1	Speaker, 5 inch PM; 3.2 ohm voice coil	85C120
	Spring, dial cord tension	75A012
TS-1	Terminal strip, antenna	88A809
TS-2	Twin jack, Phones	88A071
	Washer, extruded; chassis-cabinet insulating	4A646
	Window, dial	22B345



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89E616-A

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

BOOK NO. 94X1397
1054 – RUN 1

communications

OPERATING and SERVICE INSTRUCTIONS

SR-75

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

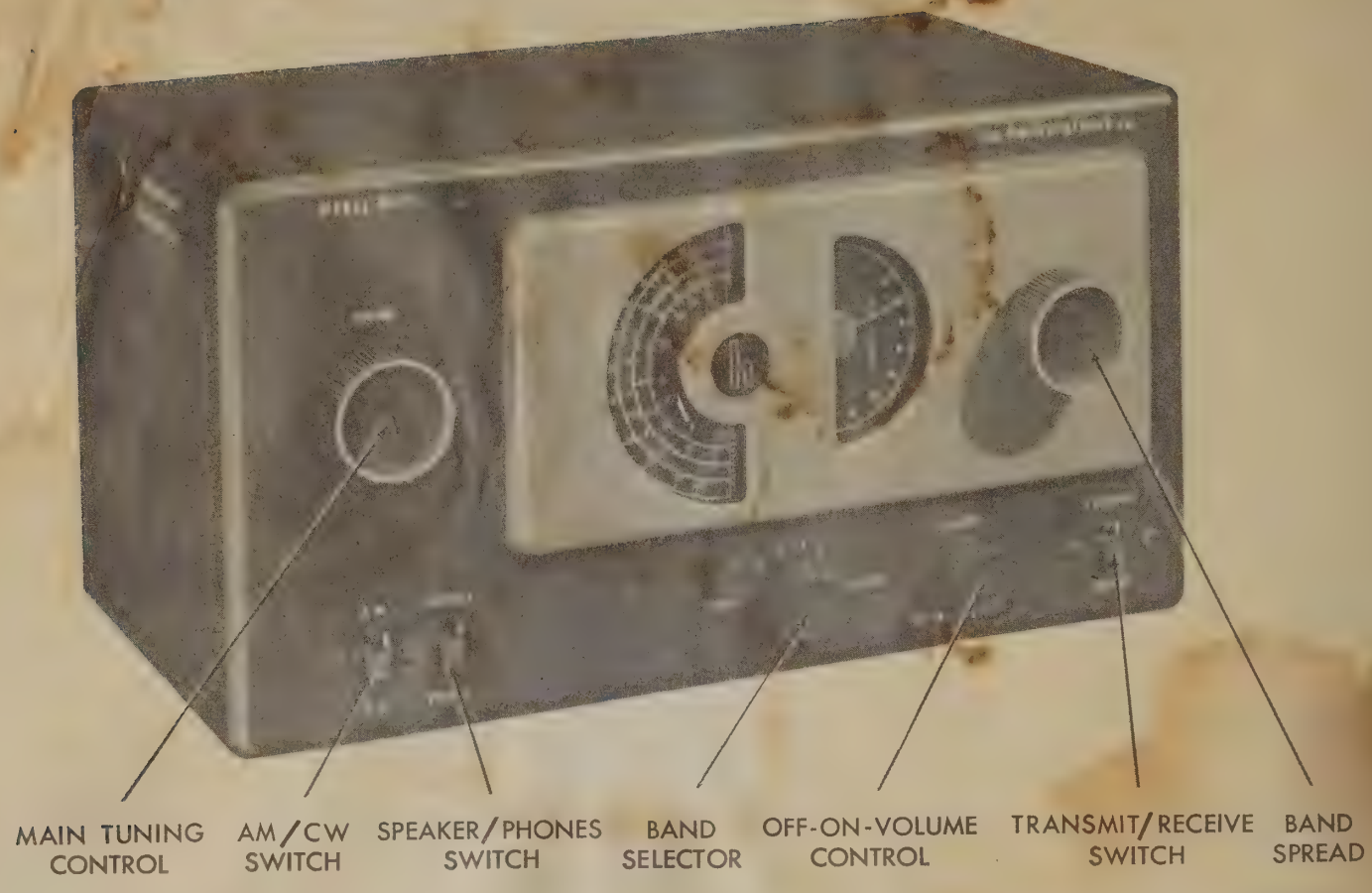


FIG. 1. SR-75 TRANSMITTER - RECEIVER

GENERAL SPECIFICATIONS

Tubes	Five plus rectifier-doubler
Voice Coil Impedance	3.2 ohms
Antenna	Provisions for external antenna with transmission line or single wire feed
Tuning	Manual
Power Supply	105-125 volts, 60 cycles AC
Speaker	5 inch PM
Headset Output	High impedance 1500 to 5000 ohms
Intermediate Frequency	455 KC
Power Consumption	50 watts

TUNING RANGE

RECEIVER

Band Selector Position	Frequency Range
1	550 KC - 1650 KC
2	1.65 MC - 5.1 MC
3	5 MC - 14.5 MC
4	13 MC - 31 MC

TRANSMITTER

Crystal Frequency	Output Frequency
3.5 MC - 3.85 MC	3.5 MC - 3.85 MC
7.0 MC - 7.2 MC	7.0 MC - 7.2 MC
	14.0 MC - 14.4 MC
	28.0 MC - 28.8 MC
6.74 MC - 6.8 MC	26.96MC - 27.2 MC

Emission	A1 (CW)
Power Input	10 Watts
Power Output	$7\frac{1}{2}$ Watts on 80 Meters to $4\frac{1}{2}$ Watts on 10 Meters

INSTALLATION

UNPACKING - Check all shipping tags and labels for instructions before removing or destroying them. The SR-75 is shipped with the cabinet back held in place with four self-tapping hex head screws. Before placing the set in operation, remove these screws and replace them with the four thumb screws which are packed with the set.

LOCATION - The SR-75 is equipped with protective feet for table top or shelf mounting. Avoid ex- excessively warm locations such as outlets for the heating system or recessed locations which prevent circulation of air. If the SR-75 is placed with its back to the wall, leave about an inch or two of clearance between the back of the cabinet and the wall for proper ventilation.

OPERATION AS A RECEIVER

CONTROL	BROADCAST RECEPTION	SHORTWAVE RECEPTION
RECEIVE/TRANSMIT switch	Set at RECEIVE	Same
VOLUME control	Turn clockwise	Same
SPEAKER/PHONES switch	Set at SPEAKER or PHONES	Same
AM/CW switch	Set at AM	Set at AM for phone and CW for code
BAND SELECTOR	Set at 1	Set at 2, 3 or 4.
TUNING control	Tune for the loudest clearest reception.	See BAND SPREAD TUNING

BAND SPREAD TUNING - Any narrow range of frequencies in the frequency spectrum covered by the SR-75 may be spread out electrically with the BAND SPREAD control. To use the band spread dial, set the band spread dial pointer to zero, set the main tuning dial pointer at the high frequency limit of the range of frequencies to be covered and then tune in the stations with the BAND SPREAD control. For example: Assume that the 40 meter amateur band is to be covered. Set the BAND SELECTOR to position "3", the main tuning dial pointer to 7.3 MC (megacycles) and tune in the stations with the BAND SPREAD control.

NOTE - The main tuning dial calibration will be true only when the band spread dial pointer is set at zero.

10 AND 11 METER OPERATION

Adjust the OSC. TUNING control (see fig. 2) for resonance as indicated by minimum brilliance of the tuning lamp or minimum current on the D.C. milliammeter if one is used.

Proceed as outlined above for 80, 40, and 20 METER OPERATION.

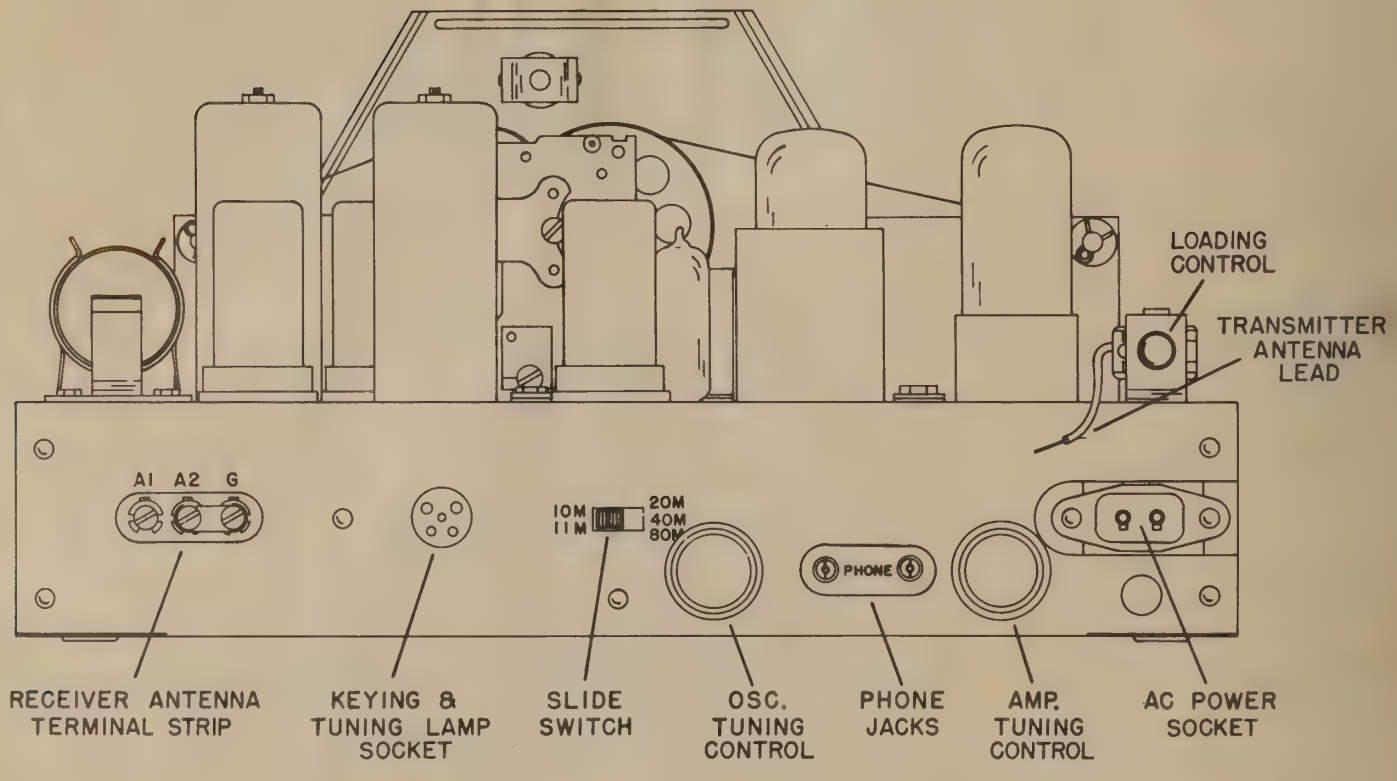


FIG. 2. REAR VIEW, CONTROLS AND CONNECTIONS

"The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models."

OPERATION AS A TRANSMITTER

Before applying power, remove the back cover and insert the appropriate crystal into the crystal socket ($\frac{1}{2}$ inch pin spacing, .093 inch diameter pin). Insert the proper coil into the banana jacks PL-4 (refer to fig. 8). An 80 meter crystal is used for 80 meter operation and a 40 meter crystal is used for operation on 40, 20, and 10 meters. The 11 meter band may be used with a crystal in the range of 6.74 to 6.8 MC.

Insert two standard #2, $1\frac{1}{2}$ volt flashlight cells (not supplied) in the holder on the top of the chassis. These cells are necessary to actuate the keying relay.

Replace the back cover making certain that the AC line cord interlock is properly seated in the socket on the rear of the chassis.

If the crystal and coil for either 80, 40 or 20 meter operation have been installed, set the slide switch on the rear of the chassis to the position indicating 80, 40 and 20 meter operation. If the crystal (40 meters) and coil for 10 or 11 meter operation have been installed, set the slide switch to the position indicating 10 and 11 meter operation.

Connect plug PL-3 on the keying and tuning lamp cable to socket SO-3 (see fig. 2). Connect a telegraph key to the two brown leads. A pilot bulb (Type #49), used for tuning purposes, is connected to the red and black leads. If desired, a 0-100 milliampere D.C. meter may be used in place of the tuning lamp, the red lead being connected to the plus terminal.

Connect the proper antenna. (Refer to page 6).

CAUTION: When switching from RECEIVE to TRANSMIT it is important that: (1) the shorting switch on the telegraph key is left open and (2) the key is not held down. A current transient great enough to burn out the tuning lamp results if these precautions are not observed.

Set the TRANSMIT-RECEIVE switch to the TRANSMIT position.

Turn the VOLUME control sufficiently clockwise to close the power switch.

Turn the LOADING control (see fig. 2) fully clockwise.

80, 40 AND 20 METER OPERATION

Close the key and adjust the AMPLIFIER TUNING (see Fig. 2) to resonance as indicated by a pronounced dip in the brilliance of the tuning lamp or current meter reading. (Inserting a 0-500 milliampere thermocouple R.F. ammeter or a suitable pilot bulb* in series with the antenna lead is a good indicating device to assure maximum transfer of energy into the antenna, since under certain conditions maximum power output and the resonance dip may deviate slightly. If a pilot bulb is used in the antenna lead, it should be shorted out or removed with transmitting.)

Turn the LOADING control counter-clockwise in small steps, each time adjusting the AMP. TUNING for a minimum indication on the tuning lamp or D.C. meter. It will be noted that as the LOADING control is turned farther clockwise the dip becomes less pronounced. When the transmitter is properly loaded, the minimum of the dip should not go below 40 milliamperes. Maximum transfer of energy into the antenna circuit is indicated by a maximum indication of the pilot bulb or R.F. ammeter in series with the antenna lead.

* Use any bulb that will give a suitable indication. The current rating, as indicated by the color of the bead, will be determined by the type of antenna and frequency used. For pilot bulb data, refer to the "Miscellaneous Data" section in the ARRL "RADIO AMATEURS HANDBOOK".

TRANSMITTING ANTENNA

The transmitting antenna may be in the form of a single wire installation or half-wave doublet. It is recommended that the doublet be used when transmitting on the higher frequency bands. Antenna heights between 35 to 70 feet are usually suitable for all bands. Keep the antenna clear of surrounding objects insofar as possible. For further information concerning antennas refer to the "ARRL ANTENNA HANDBOOK".

SINGLE WIRE ANTENNA

If a single wire antenna is to be used, the overall length (including lead-in), should be between 50 and 60 feet. It is then connected to the phenolic covered antenna lead located at the rear of the set. For details of construction see fig. 3.

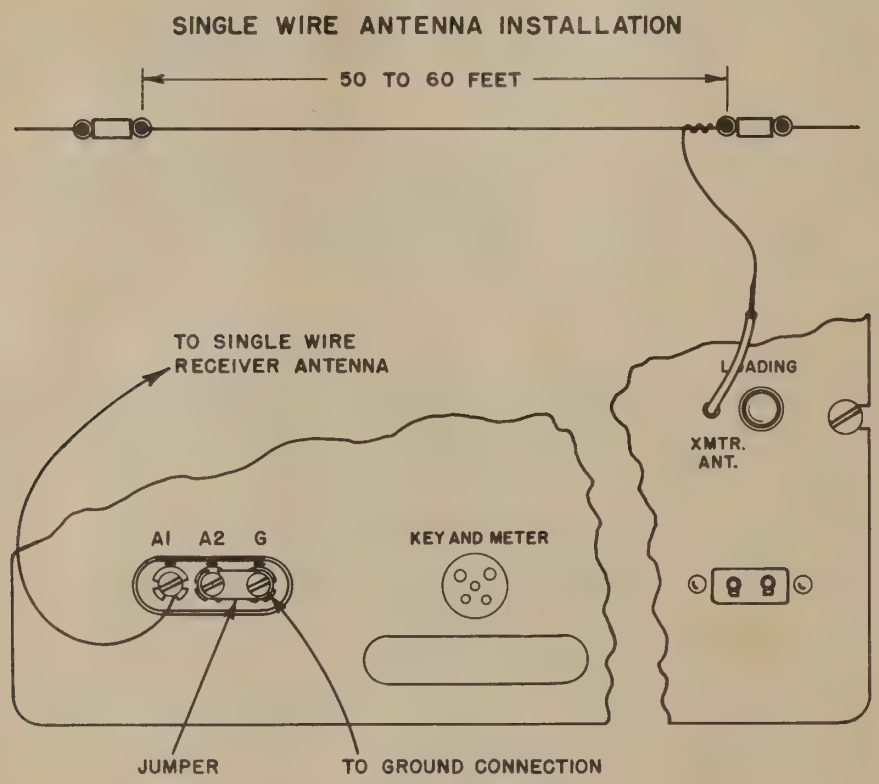


FIG. 3. SINGLE WIRE ANTENNA CONSTRUCTION DETAILS AND CONNECTIONS

DOUBLET ANTENNA

The construction of the half-wave doublet antenna is as shown in fig. 4. The antenna length (feet) is determined by dividing the constant 468 by the operating frequency in megacycles. No. 12 or No. 14 enameled wire is generally used for the antenna.

Since the impedance at the center of a doublet antenna is approximately 75 ohms it should be fed with a 75-ohm Twin-Lead, twisted pair, or coaxial transmission line. The transmission line should be run away at right angles to the antenna if possible; one conductor being connected to the antenna lead at the rear of the set and the other to terminal "G" on terminal strip TS-1. If a coaxial line is used, connect the outer conductor to terminal "G".

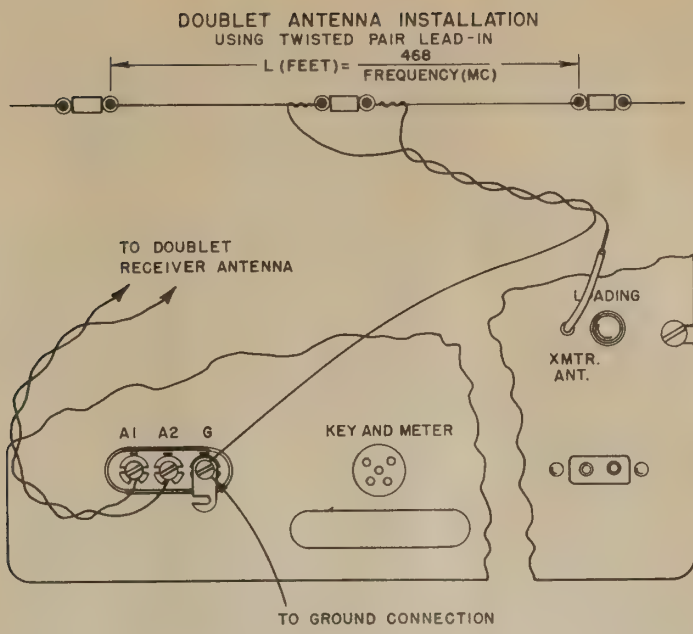


FIG. 4. DOUBLET ANTENNA CONSTRUCTION DETAILS AND CONNECTIONS

RECEIVING ANTENNAS

A short single wire antenna (15 to 20 feet including lead-in) is recommended for general CW reception. A full size antenna of either of the types illustrated for transmitting may be used for transmitting may be used for receiving modulated or weak code signals. CAUTION: The same antenna should never be connected to the transmitter and receiver simultaneously. Also, the transmitting and receiving antennas should be located as far apart as possible.

For further information concerning antennas refer to the "ARRL ANTENNA HANDBOOK".

If special problems such as BCL or TVI are present because of your particular location, consult your HALLICRAFTERS dealer or authorized service center.

SERVICE

RESTRINGING DIAL CORD

To restring the main tuning dial cord cut a 17-inch length of 30 lb. test dial cord and tie one end to the tension spring at position "1" on the diagram. Follow the sequence "1" through "15", and at position "15" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord, cut a 13½-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

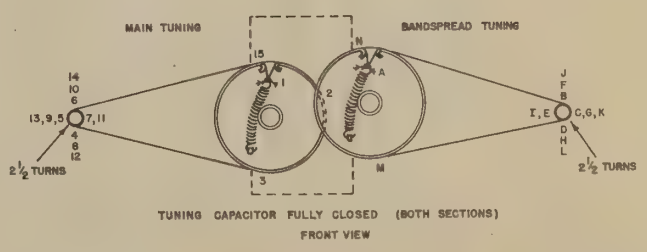


FIG. 5. DIAL CABLE STRINGING PROCEDURE

TUBE REPLACEMENT

The types of tubes required and their relative position in the receiver are shown in the illustration, Fig. 8. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; and push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing into place. Handle with care as all tubes are considered fragile and do not tolerate much mechanical abuse.

DIAL LAMP REPLACEMENT

Refer to fig. 8 for location of the dial lamp. To replace a defective lamp, reach in through the rear of the cabinet and unclip the dial lamp socket by compressing the side springs. The socket and defective lamp may then be brought out into the open for service. Make replacement with 6-8 volt Mazda #47 (brown bead) lamp.

SERVICE OR OPERATION QUESTIONS

For further details regarding operation or servicing of the SR-75 contact your dealer. Make no service shipments directly to the factory before first writing for authorization and instructions.

RECEIVER ALIGNMENT PROCEDURE

Holes in the bottom cover permit minor adjustment of the oscillator and mixer stage trimmers, however for complete alignment, the chassis will have to be removed from the cabinet. To separate the chassis from the cabinet, remove the back cover and bottom plate. The chassis is fastened to the cabinet by four front panel screws located near the slide switches and two cabinet screws located at the bottom rear of the cabinet.

CAUTION - The four rubber grommets insulate the chassis from the cabinet. Check the condition of these grommets and replace if necessary.

The standard RMA dummy antenna specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

Set the following controls before alignment.

AM/CW . . . . . Set at AM
SPEAKER/PHONES . . Set at SPEAKER
VOLUME . . . . . Set at maximum
RECEIVE/TRANSMIT . . . . Set at RECEIVE
BAND SPREAD . . . . . Set at zero

For the settings of the remaining controls, see alignment chart.

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust	Remarks
1	.01 mfd cap.	Stator plates, front section of tuning gang	455 kc	1	1000 kc	A,B, C,D	Adjust for max. audio output at speaker voice coil. Use just enough signal generator output to obtain a suitable output indication.
2**	See step 1	See step 1	455 kc (No modulation)	1	1000 kc	E	Set the AM/CW switch at CW. (Reset the switch at AM when step 2 is completed.) Correct BFO operation is obtained by varying the coupling between the wire "E" and the 12SK7 tube grid and plate terminals (Pins 4 and 8.) Pushing the wire toward the grid terminal increases the capacity and the strength of the beat.
3	Std. RMA dummy	High side to term. A1 on antenna strip. Jumper wire between A2 and G	30 mc	4	30 mc	*F,G	Max. output as in step 1.
4	Std. RMA dummy	See step 3.	14 mc	3	14 mc	*H,J	Max. output as in step 1.
5	Std. RMA dummy	See step 3.	5 mc	2	5 mc	*K,L	Max. output as in step 1.
6	Std. RMA dummy	See step 3.	1500 kc 600 kc	1	1500 kc 600 kc	*M,N *P	Max. output as in step 1.

* Note - Calibration adjustments.

** Note - This step is generally unnecessary. Adjustment should be made if a weak beat note is obtained on strong c-w signals indicating lack of coupling between wire "E" and tube socket wiring.

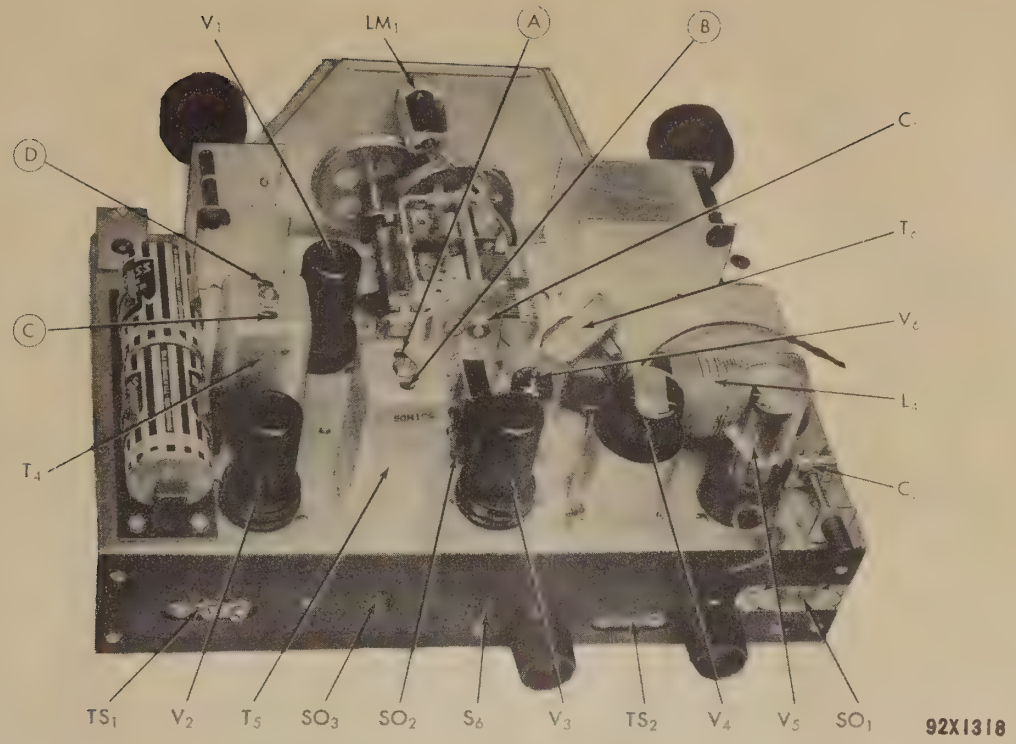


FIG. 6. TOP VIEW, ALIGNMENT ADJUSTMENTS AND COMPONENT LOCATION

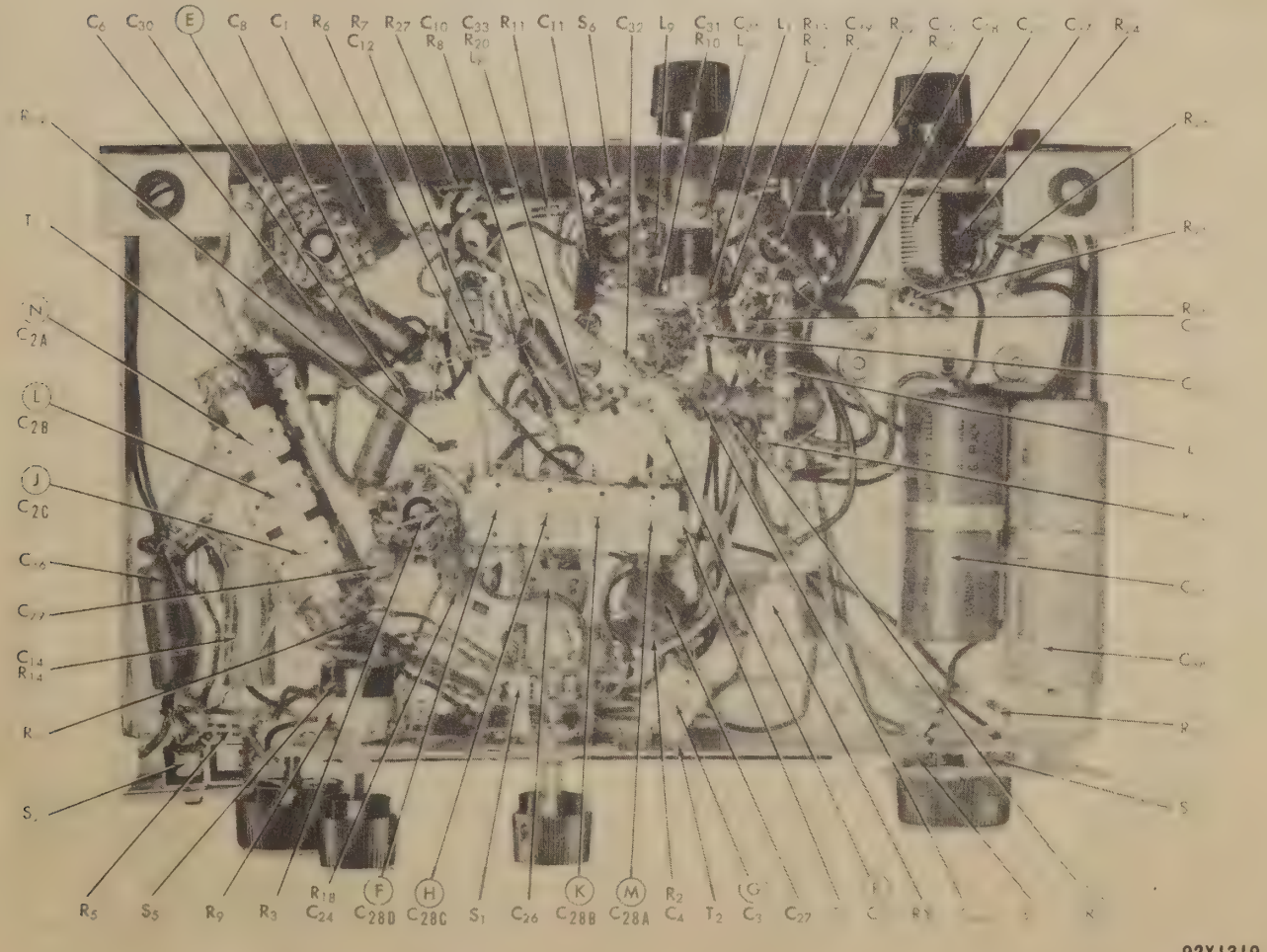


FIG. 7. BOTTOM VIEW, ALIGNMENT ADJUSTMENTS AND COMPONENT LOCATION

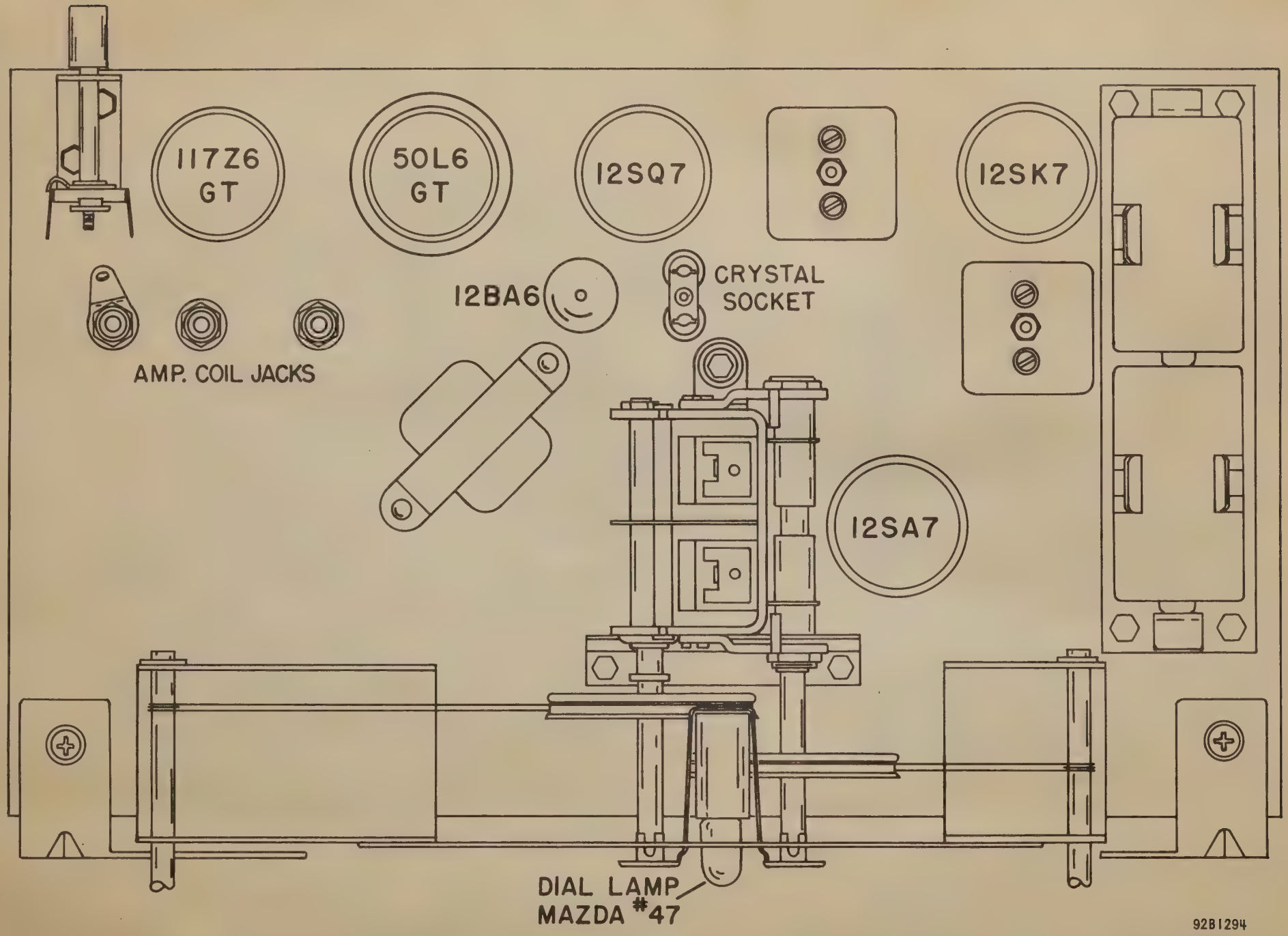
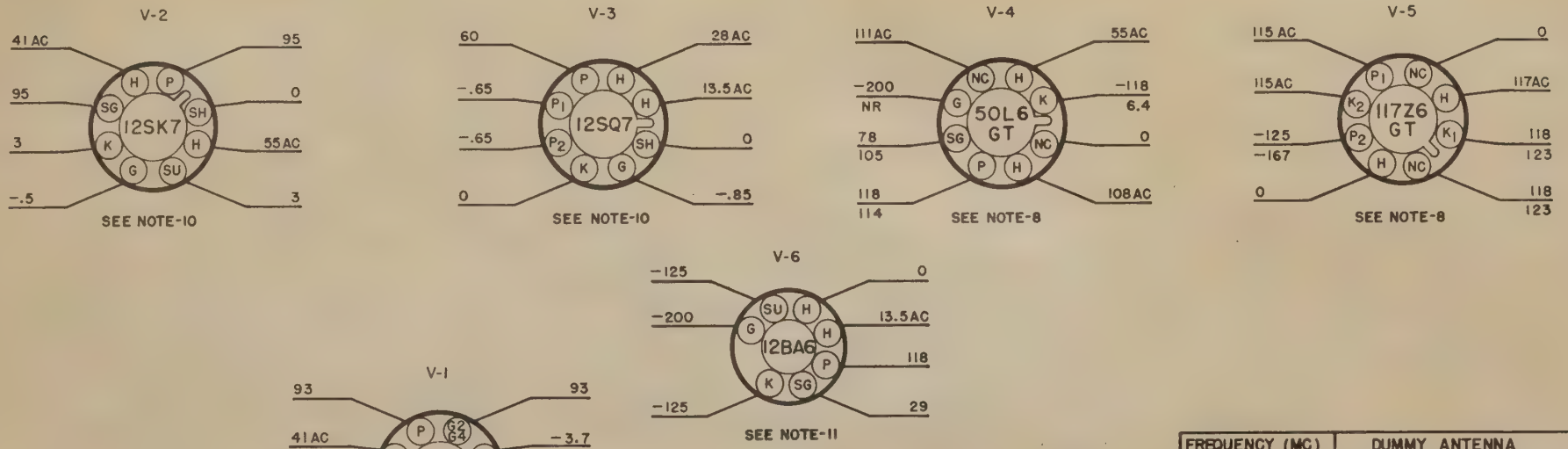


FIG. 8. TOP VIEW, LOCATION OF TUBES, DIAL LAMP, CRYSTAL SOCKET AND AMP. COIL JACKS

SERVICE PARTS LIST

Ref. No.	Description	Manufacturer's Part Number
	CAPACITORS	
C-1,10	.01 mfd. 600 V., tubular	46AZ103J
C-2	Trimmers, adj. (part of T-1)	
C-3	Trimmer, adjustable (for T-2)	44A039
C-4	2700 mmf. 500 V., mica	47X30B272K
C-5	Main tuning and bandspread capacitor assembly	48C162-1
C-6	.25 mfd. 200 V., tubular	46AT254J
C-7,9	Wiring capacity	
C-8,30	.05 mfd. 200 V., tubular	46AT503J
C-11	Capacitor, composite; 5000, 2X220, and 2000 mmf; 500 V., ceramic	46A151
C-12	100 mmf. 500 V., mica	47X20B101K
C-13	110 mmf. ceramic	47X30UJ111K
C-14	30 mfd. 25 V., electrolytic	45A034
C-15,17, 31,34,35	5000 mmf. 450 V., ceramic	47A168
C-16	60-40-40 mfd. 150 V., electrolytic	45B091
C-18	1000 mmf. 450 V., ceramic	47A229
C-19	.02 mfd. 600 V., tubular	46AZ203J
C-20	100 mmf. variable air; AMP. TUNING	48A249-B
C-21	LOADING capacitor assembly	44B393
C-22	47 mmf. (part of L-5)	
C-23	120 mmf. (part of L-7)	
C-24	220 mmf. 500 V., mica	47X20B221K
C-25	Padder, adjustable (Band 1)	44A349
C-26	3000 mmf. 500 V., mica	47X30B302K
C-27,37	2200 mmf. 500 V., mica	47X30B222K
C-28	Trimmers, adjustable (part of T-3)	
C-29	.02 mfd. 400 V., tubular	46AW203J
C-32	24 mmf. ceramic	47X20UJ240K
C-33	50 mmf. ceramic (part of L-8)	
C-36	.1 mfd. 600 V., tubular	46AZ104J
C-38	40 mfd. 300 V., 40 mfd. 150 V., 40 mfd. 150 V.; electrolytic	45B176
C-39	2X4000 mmf. 450 V., ceramic	47A218
	RESISTORS	
R-1	10,000 ohms 1/2 watt, carbon	23X20X103K
R-2,6,12	470,000 ohms 1/2 watt, carbon	23X20X474K
R-3	22,000 ohms 1/2 watt, carbon	23X20X223K
R-4	470 ohms 1/2 watt, carbon	23X20X471K
R-5	390 ohms 1/2 watt, carbon	23X20X391K
R-7	2.2 megohms 1/2 watt, carbon	23X20X225K
R-8	47,000 ohms 1/2 watt, carbon	23X20X473K
R-9	2 megohms, VOLUME control	25B914
R-10	10 megohms 1/2 watt, carbon	23X20X106K
R-11	220,000 ohms 1/2 watt, carbon	23X20X224K
R-13	100,000 ohms (part of L-2)	
R-14	150 ohms 1/2 watt, carbon	23X20X151K
R-15,18	47 ohms 1/2 watt, carbon	23X20X470K
R-16	4700 ohms 1/2 watt, carbon	23X20X472K
R-17	15 ohms 1/2 watt, carbon	23X20X150K
R-19,24	22 ohms 1/2 watt, carbon	23X20X220K
R-20	56,000 ohms 1/2 watt, carbon	23X20X563K
R-21	27,000 ohms 1/2 watt, carbon	23X20X273K
R-22	39 ohms 2 watts, carbon	23X40X390K
R-23	39 ohms 1/2 watt, carbon	23X20X390K
R-25	47,000 ohms 1 watt, carbon	23X30X473K
R-26	1200 ohms 1/2 watt, carbon	23X20X122K
R-27	100 ohms 1/2 watt, carbon	23X20X101K
	TRANSFORMERS AND COILS	
T-1	Coil, antenna (Bands 1, 2 and 3)	51C821
T-2	Coil, antenna (Band 4)	51B1015
T-3	Coil, oscillator (Bands, 1, 2, 3 and 4)	51C822
T-4	Transformer, 1st I-F	50B183
T-5	Transformer, I.F. (Diode)	50B184
T-6	Transformer, audio output	55A127
L-1,9	Choke, plate and grid	53A205
L-2	Choke parasitic	53A206
L-3	Choke, R.F.	53A038
L-4	Coil, amplifier (10 and 11 meters)	51B1291
L-5	Coil, amplifier (20 meters)	51B1292
L-6	Coil, amplifier (40 meters)	51B1293
L-7	Coil, amplifier (80 meters)	51B1294
L-8	Choke, cathode reactor	56A123
L-10	Coil, variable; OSC. TUNING	51B1295
	SWITCHES	
S-1	Switch, rotary wafer; BAND SELECTOR	60C393
S-2	Switch, slide; 4PDT; TRANSMIT-RECEIVE	60A396-C
S-3	Switch, slide; SPDT; CW-AM	60A243
S-4	Switch, slide; SPDT; PHONES-SPEAKER	60A243
S-5	Switch, power (part of VOLUME control R-9)	
S-6	Switch, slide; DPDT (10,11M - 20, 40, 80M)	60A381
RY-1	Relay, SPDT	21A116
	PLUGS, SOCKETS AND TERMINAL TRIPS	
PL-1	Line cord and plug PL-2	87B1668
PL-3	Plug, keying and tuning lamp	10A197
PL-4	Jack assembly, banana type	36A001
TS-1	Terminal strip, receiving antenna	88A671
TS-2	Strip, phone jack	88A071
	Socket, dial light	86A011
SO-1	Socket, a-c power	10A286
SO-2	Socket, crystal	6A346
SO-3	Socket, keying and tuning lamp	6A246
	Socket, octal (Tubes V-1,2,3,5)	6A250
	Socket, 7 pin min. (Tube V-6)	6B297
	Socket, octal (Tube V-4)	6A317
	Socket, tuning lamp (includes leads)	86A103
	TUBES, RECTIFIERS AND LAMPS	
V-1	Type 12SA7, converter	90X12SA7
V-2	Type 12SK7, I.F. amplifier	90X12SK7
V-3	Type 12SQ7, 2nd detector; AVC	90X12SQ7
V-4	Type 50L6GT, audio/R.F. amp.	90X50L6GT
V-5	Type 117Z6GT, rectifier	90X117Z6GT
V-6	Type 12BA6, transmitter oscillator	90X12BA6
LM-1	Lamp, dial; GE #47 (brown bead)	39A004
LM-2	Lamp, tuning; Mazda #49 (pink bead)	39A017
	MISCELLANEOUS	
	Baffle, speaker	78B198
	Bracket, switch mtg. (L.H.)	67B1309
	Bracket, switch mtg. (R.H.)	67A1349-B
	Cabinet	66B628
	Cabinet back	8C1183-B
	Cabinet bottom	8C1184
	Clip, battery	76A634
	Clip, battery mtg.	76A635
	Dial cord	38A019
	Dial scale	83C378
	Knob, TUNING and BANDSPREAD	15A047
	Knob, VOLUME, BAND SELECTOR and AMP. TUNING	15A049
	Knob, OSC. TUNING	15A058
	Mounting foot, rubber	16A007
	Pointer, bandspread	82A103
	Pointer, main tuning	82A177
	Retainer, spring	75A062
	Shaft, bandspread	74A319
	Shaft, main tuning	74A318
	Shell, plug (part of PL-3)	10A052
	Spring, dial cord	75A012
	Speaker, 5 inch PM	85C030
	Strip, battery mounting	8B1181
	Window, dial	22B311
	Wrench, Allen #6	33-035
	Grommet, insulating; rubber	16A008
	Insulator, nylon (fits in insulating grommet)	4A647
	Washer, insulating	4A646



FREQUENCY (MC)	DUMMY ANTENNA
3.5 - 3.85	125 MMF MICA CAPACITOR IN SERIES WITH A 34 OHM NON-INDUCTIVE RESISTOR
7.0 - 7.3 14.0 - 14.4 26.96-27.23 28.0 - 29.7	125 MMF MICA CAPACITOR IN SERIES WITH A 73 OHM NON-INDUCTIVE RESISTOR

FRONT APRON

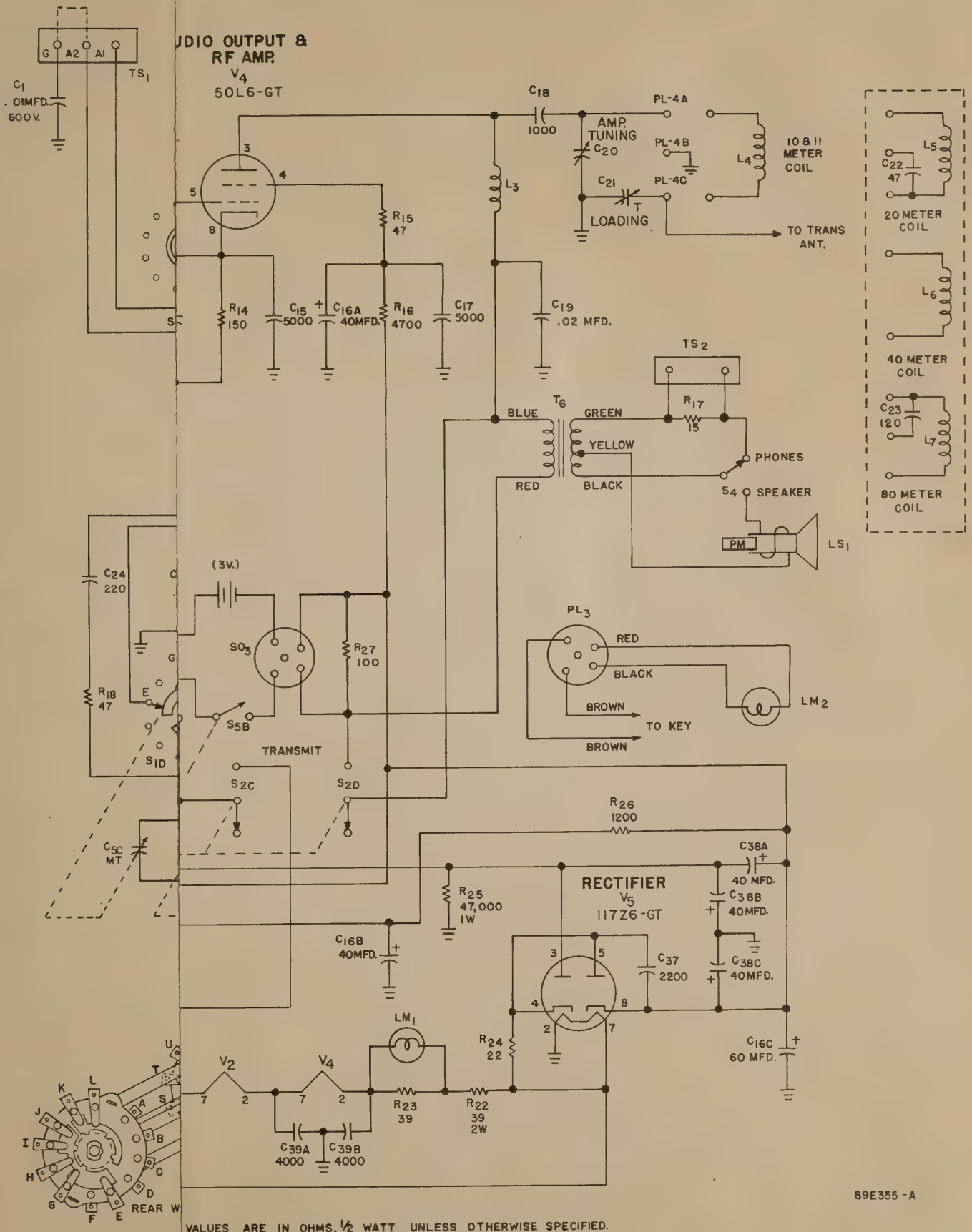
BOTTOM VIEW OF CHASSIS

NOTES

1. SOCKET VIEWS ARE BOTTOM VIEWS
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & CHASSIS, WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE- 117V. AC.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VTVM.
6. "NC" - NO CONNECTION (VOLTAGES SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG.
7. "NR" - NOT READABLE (READING GENERALLY MEANINGLESS).
8. TRANSMIT / RECEIVE WHERE TUBE SOCKET VOLTAGES CHANGE FROM RECEIVE TO TRANSMIT OPERATION TWO READINGS ARE SHOWN. THE UPPER READING IS WITH THE TRANSMIT/RECEIVE SWITCH SET AT "TRANSMIT" WHILE THE LOWER READING IS WITH THE SAME SWITCH SET AT "RECEIVE".
9. ALL TRANSMITTER VOLTAGE MEASUREMENTS WERE MADE WITH THE TRANSMIT/RECEIVE SWITCH IN THE "TRANSMIT" POSITION, THE KEY CLOSED AND THE TRANSMITTER TUNED TO RESONANCE WITH AN 80 METER COIL AND CRYSTAL. A DUMMY ANTENNA WAS USED AS SHOWN IN THE TABLE.
10. VOLTAGE READINGS FOR V-1, 2 & 3 WERE TAKEN WITH THE TRANSMIT/RECEIVE SWITCH IN THE "RECEIVE" POSITION, THE BAND SELECTOR SWITCH AT BAND 4 POSITION AND THE AM/CW SWITCH AT "AM".
11. VOLTAGE READINGS FOR V-6 WERE TAKEN WITH THE TRANSMIT/RECEIVE SWITCH IN THE "TRANSMIT" POSITION ONLY.
12. TRANSMITTER VOLTAGE READINGS SHOWN ARE FOR 80 METER OPERATION AND MAY VARY SLIGHTLY ON THE OTHER BANDS.

FIG. 9. TUBE SOCKET VOLTAGE CHART

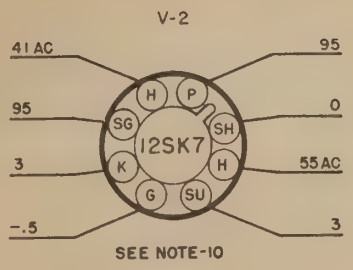
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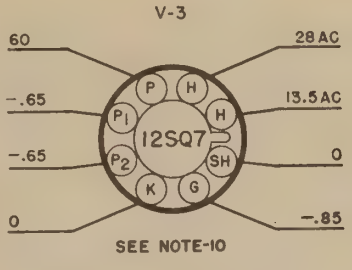
VALUES ARE IN OHMS, ½ WATT UNLESS OTHERWISE SPECIFIED.
VALUES ARE MMF. UNLESS OTHERWISE SPECIFIED.
C7 & C9 DUE TO PLACEMENT OF WIRE.
BAND 4 POSITION
GROUND
GROUND
SYMBOL — C-39
SYMBOL — R-27
SYMBOL — L-10

SR-75

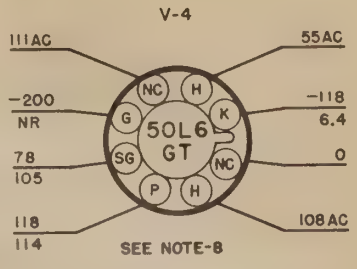
FIG. 10. SCHEMATIC DIAGRAM



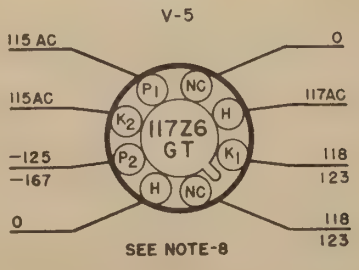
SEE NOTE-10



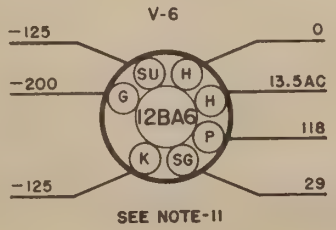
SEE NOTE-10



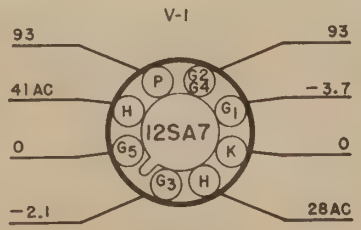
SEE NOTE-8



SEE NOTE-8



SEE NOTE-11



SEE NOTE-10

FREQUENCY (MC)	DUMMY ANTENNA
3.5 - 3.85	125 MMF MICA CAPACITOR IN SERIES WITH A 34 OHM NON-INDUCTIVE RESISTOR
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FRONT APRON

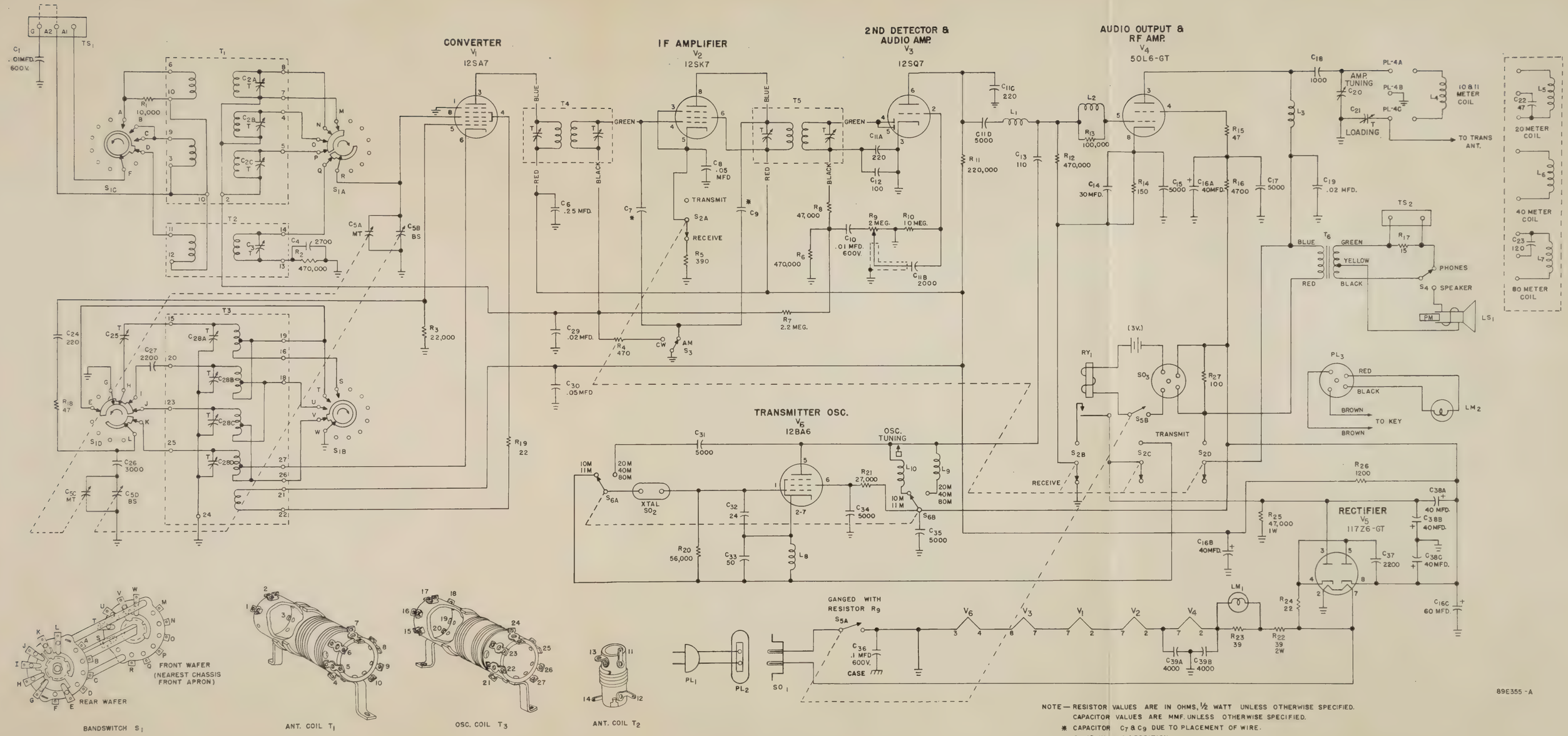
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FIG. 9. TUBE SOCKET VOLTAGE CHART

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VALUES & TOLERENCES SHOWN ARE NOMINAL & VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

NOTE — RESISTOR VALUES ARE IN OHMS, ½ WATT UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE MMF. UNLESS OTHERWISE SPECIFIED.
* CAPACITOR C7 & C9 DUE TO PLACEMENT OF WIRE.
S1 IS IN BAND 4 POSITION
⏚ CHASSIS GROUND
⏚ CABINET GROUND
LAST C SYMBOL — C-39
LAST R SYMBOL — R-27
LAST L SYMBOL — L-10

SR-75

FIG. 10. SCHEMATIC DIAGRAM

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

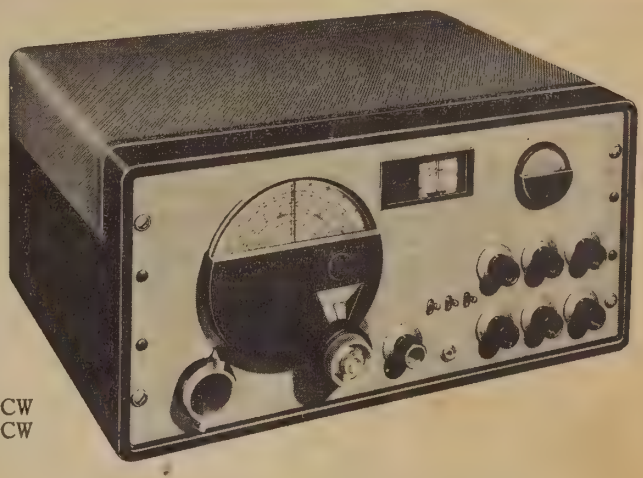
the Hallicrafters co.

BOOK NO.
92X633
1250

JANUARY, 1949
94X317
Run No. 2
SEE CHASSIS
STAMP

the hallicrafters co.

SERVICE BULLETIN FOR MODEL SX-42



GENERAL:

Tubes.	Fourteen plus rectifier
Speaker Output	500/5000 Ohms
Headset Output	High Impedance
Antenna Input.	For 72 to 600-ohm line or single wire lead-in
Phono Input. .	High Impedance
External Power Connector . .	Std. Octal Socket
Tuning Range .	Band 1. 540 kc - 1620 kc AM/CW
	2. 1.6 mc - 5 mc AM/CW
	3. 5 mc - 15 mc AM/CW
	4. 15 mc - 30 mc AM/CW
	5. 27 mc - 55 mc AM/FM/CW
	6. 55 mc - 110 mc AM/FM/CW
Intermediate Frequency . .	455 kc/10.7 mc.
Power Supply .	105-125 V. 50/60 cycles AC.
Power Consumption.	110 Watts

CARRIER LEVEL METER ADJUSTMENT:

1. Before turning on the receiver, set the pointer adjustment screw on the face of the meter for the right hand rest position. (Line up the pointer with the last division on the scale.)

2. Connect a jumper between the two antenna terminals (A1 and A2) and ground. (GND.)

3. Set front panel controls as follows:

   SENSITIVITY - Maximum
   RECEPTION - AM
   SELECTIVITY - Normal/Sharp
   AVC SWITCH - AVC
   RECEIVE-STANDBY SWITCH - Receive
   BAND SELECTOR - 15/30
   VOLUME - Maximum (No signal should be heard.)

4. Set S METER ADJ. control located on rear chassis apron for the "S" unit zero on the CARRIER LEVEL meter.

POSITIONING CONTROL KNOBS:

BAND SELECTOR - As required by markings
VOLUME - Zero at full counter clockwise rotation.
CRYSTAL PHASING - Zero with plates half meshed.
RECEPTION - As required by markings.
CW PITCH - Zero with plates half meshed.
SELECTIVITY - As required by markings.
TONE - As required by markings.
SENSITIVITY - Zero at full counter clockwise rotation.

RESTRINGING DIAL CORD:

Two dial drive cords are used on the bandspread dial drive mechanism. To restring the upper dial cord, use a length of 18 lb. test cord and tie one end to the tension spring in the large pulley at position 1. in the diagram. Follow the numbers 1 through 15., stretch the tension spring and tie the cord securely. To restring the lower dial cord, tie the cord at A and follow the lettered route A through N as illustrated.

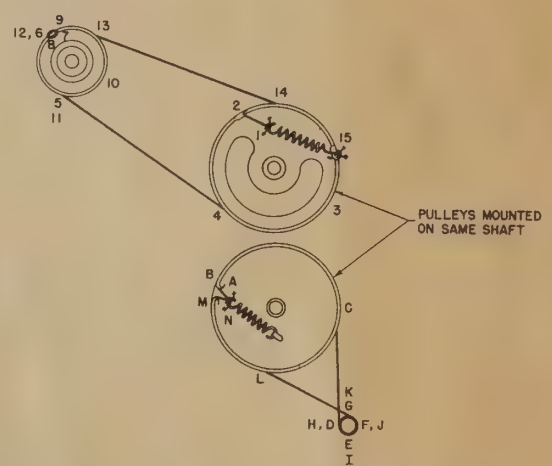


Fig. 1. Dial cable stringing procedure.

REPLACING LAMPS:

There are three dial lamps and one meter lamp. To replace the lamps, it is necessary to remove the receiver chassis from the cabinet and remove the light shield across the top of the dial drive mechanism. The chassis is fastened to the cabinet by four front panel screws and three chassis screws at the bottom rear of the cabinet. The light shield is held down by four screws, two at each end of the channel. Replace the dial lamps with 6-8 V. 250 MA. G.E. #44 (Blue bead) lamps or equivalent. The meter lamp is removed by pulling the socket straight out of the grommet. Replace this lamp with 6-8 V. 150 MA. G.E. #47 (Brown bead) or equivalent. *Do not use a 250 MA. lamp in the meter housing as the excessive heat will discolor the meter scale.* Refer to the SERVICE PARTS LIST for recommended lamps with a green tint.

ALIGNMENT PROCEDURE

The standard RMA dummy antenna mentioned in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 ohm carbon resistor.

Throughout the alignment of the receiver, the bandspread dial must be set at zero to obtain exact calibration on the general coverage dial.

I.F. ALIGNMENT (455 kc) - Set the controls as follows:

BAND SELECTOR - .54/1.62
AVC - OFF.
NOISE LIMITER - Off.
RECEIVE-STANDBY - RECEIVE
RECEPTION - AM
SELECTIVITY - NORMAL/SHARP.
SENSITIVITY - Near maximum
VOLUME - Near maximum
General coverage dial set at approx. 1000 kc.

Connect signal generator through an 0.1 mfd capacitor to pin #1. of the 7F8 converter stage.

With signal generator set at approx. 455 kc. align slugs S-1, 3, 5, 10, 12 and 14 for maximum output.

Set RECEPTION control at CW and CW PITCH knob at zero and adjust slug S-8 for zero beat. Reset the CW PITCH control for a 1000 cycle note.

Turn SELECTIVITY control to CRYSTAL/BROAD and while slowly turning slug S-10 in one direction, "rock" the signal generator and observe that the signal output decreases, then slowly increases. Set signal generator at weaker of two signals on each side of zero beat and adjust CRYSTAL PHASING control for a complete null. This setting is left untouched for following adjustments.

Turn SELECTIVITY control to CRYSTAL/SHARP and with C-61 set near minimum capacity, slowly increase its capacity while "rocking" the signal generator and adjust for maximum output. It may be necessary at this point to reduce the signal generator input and the receiver sensitivitv to prevent overloading. After peaking the adjustment, turn the trimmer in until a drop in output of about 2 db occurs. At this point the sharp crystal will have very good selectivity without sacrificing too much gain.

Tune the signal generator to exact crystal frequency and note output meter reading. Set SELECTIVITY control at CRYSTAL/BROAD and note drop and output meter reading. Now switch to CRYSTAL/MEDIUM and with C-60 near minimum capacity, slowly increase its capacity, while "rocking" the signal generator, until the output meter indicates about midway between the output reading in sharp crystal and broad crystal position.

Set the SELECTIVITY control at CRYSTAL/SHARP and reset signal generator for the exact crystal frequency, then switch to NORMAL/SHARP and reset slugs S-1, 3, 5, 12, 14 and trimmer C-58 for maximum output.

Now repeat the adjustment of the BFO slug S-8 for zero beat with the CW PITCH control set at zero.

IF ALIGNMENT (10.7 mc) - Set the controls as follows:

BAND SELECTOR - 28/55
AVC - OFF
NOISE LIMITER - Off
RECEIVE-STANDBY - RECEIVE
RECEPTION - AM
SELECTIVITY - NORMAL/SHARP
SENSITIVITY - Near maximum
VOLUME - Near maximum.
General coverage dial set about midscale.

Connect signal generator through an 0.1 capacitor to pin #1 of the 7F8 converter stage.

Set signal generator for 10.7 mc and adjust slugs S-4, 6, 9, 13, 15 for maximum output. Now set slugs S-2 and S-11 for maximum output, but do not readjust slugs S-4, 6, 9, 13 and 15.

Set RECEPTION control at CW and adjust slug S-17 for zero beat with the CW PITCH control set at zero.

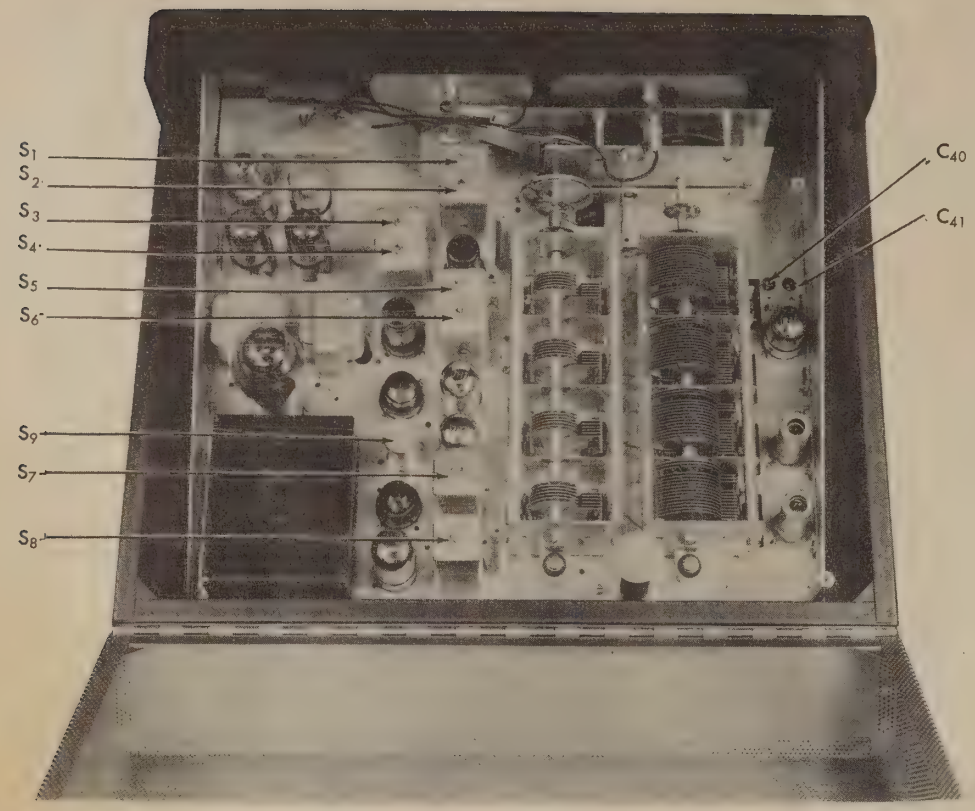
Set RECEPTION control at FM and adjust slug S-16 for maximum output. Now set slug S-7 for the null or minimum output as indicated on the output meter. Check the discriminator by slowly tuning the signal generator through 10.7 mc and observe the two maximum audio level readings on the output meter. If the two peaks are equal, the job is done; if not, it may be necessary to reset slug S-16 until balance is obtained.

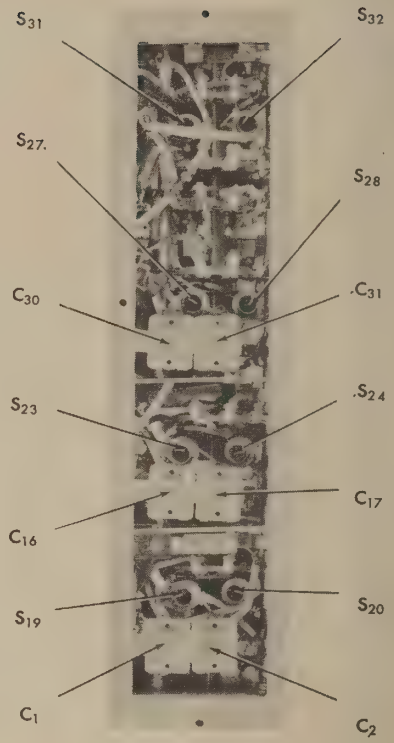
RF ALIGNMENT - After completing the alignment of the IF stages, the RF stages may be aligned according to the following alignment chart. Connect the signal generator to terminal A-1 through the dummy antenna specified and connect a jumper between antenna terminal A-2 and GND,

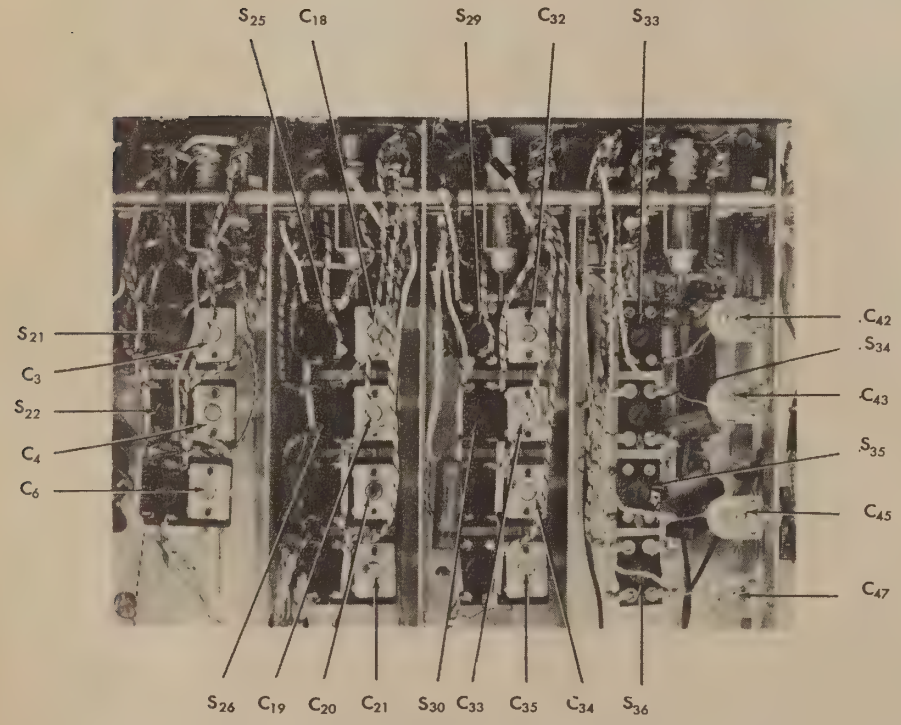
ALIGNMENT PROCEDURE

Dummy Antenna	Signal Generator Frequency	Band Selector Pos.	Radio Dial Setting	Adjust	Remarks
RMA 200PF 20uH 400Ω	1500 kc	.54/1.62	1500 kc	C-47*, 6, 21, 35	Adjust for max. output.
	600 kc		600 kc	S-36*	
RMA	4.5 mc	1.62/5.0	4.5 mc	C-45*, 20, 34	Adjust for max. output
	2.0 mc		2.0 mc	S-35*	
RMA	14.0 mc	5/15	14.0 mc	C-43*, 4, 19, 33	Adjust for max. output
	7.0 mc		7.0 mc	S-34*, 22, 26, 30	
RMA	28 mc	15/30	28 mc	C-42*, 3, 18, 32	Adjust for max. output
300-ohm non inductive resistor	50 mc	28/55	50 mc	C-41*, 2, 17, 31	Adjust for max. output
	30 mc		30 mc	S-32*, 20, 24, 28	
300-ohm non inductive resistor	105 mc	55/108	105 mc	C-40*, 1, 16, 30	Adjust for max. output
	60 mc		60 mc	S-31*, 19, 23, 27	

* Note - Calibration adjustment







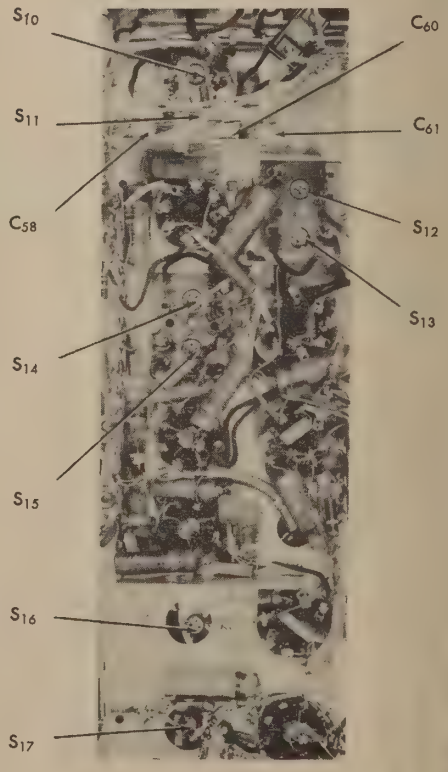


Fig. 2. Top, bottom and side views showing alignment adjustments.

SERVICE PARTS LIST

CAPACITORS

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
C-1, 2, 16, 17, 30, 31	Capacitor, trimmer, dual mounting ass'y	44B165
C-3, 4, 6, 18, 19, 20, 21, 32, 33, 34, 35,	Capacitor, trimmer. Part of transformers T-3, 4, 5, 8, 9, 10, 11, 14, 15, 16 & 17 respectively.	
C-5, 129, 130	2 mmf. 500 V., molded bakelite.	49A002
C-7	5 mmf. 500 V. T.C., ceramic	CC20UK050D
C-8, 11, 25	.05 mfd. 200 V., tubular paper	46A091
C-9	Capacitor, tuning, general coverage	48C158
C-10	Capacitor, tuning, bandspread	48C159
C-12, 26	.01 mfd. 400 V., tubular paper	46AB103J
C-13, 15, 27, 29, 50, 59, 63, 74, 86, 87, 91, 100, 104, 109, 112, 132	.02 mfd. 400 V., tubular paper	46AW203J
C-14, 28	5600 mmf. 500 V., mica	CM35A562M
C-22	15 mmf. 500 V. T.C., ceramic	CC20UK150K
C-23, 62, 70, 84, 85	.05 mfd. 200 V. tubular paper	46AU503J
C-24	.25 mfd. 200 V., tubular paper	46AT254J
C-37, 97	47 mmf. 500 V., mica	CM20A470K
C-38, 75, 92, 106, 121, 122, 131	.01 mfd. 400 V., tubular paper	46AW103J
C-39, 49	110 mmf. 500 V. T.C., ceramic	CC25UK111J
C-40, 41	Capacitor, trimmer 4-20 mmf	44A078
C-42	Capacitor, trimmer 55-75 mmf	44A347
C-43, 45	Capacitor, trimmer 2-6 mmf	44A077
C-44	4700 mmf. 500 V., mica	CM35C472G
C-46	1500 mmf. 500 V., mica	CM30C152G
C-47	Capacitor, trimmer 4-20 mmf	44A076
C-48	470 mmf. 500 V., mica	CM20A471G
C-51	220 mmf. 500 V., mica	CM25E221G
C-52, 66, 71, 99,	.05 mfd. 400 V., tubular paper	46AW503J
C-57, 105	Capacitor, variable, CW PITCH & CRYSTAL PHASING	48A064
C-58, 60, 61	Capacitor, trimmer ass'y	44B164
C-89, 90	180 mmf. 500 V., mica	CM20A181K
C-98	560 mmf. 500 V., mica	CM25A561K
C-107	10 mfd. 25 V., electrolytic	45A064
C-108, 118	.05 mfd. 600 V., tubular paper	46AY503J
C-110	680 mmf. 500 V., mica	CM25A681K
C-111, 113, 116	20 mfd. 25 V.: 30-20 mfd. 450 V. electrolytic	45A041
C-114, 115, 117	.01 mfd. 600 V., tubular paper	46AG103J
C-120	7 mmf. 500 V. T.C., ceramic	CC20UK070K
C-123	15 mmf. 500 V. T.C., ceramic	CC20UK150K
C-127	100 mfd. 25 V., electrolytic	45A116
C-133, 134, 135	.01 mfd. 600 V., tubular paper	46AY103J

SERVICE PARTS LIST (Continued)

RESISTORS

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
R-1, 10, 51	100,000 ohms ½ watt, carbon	RC20AE104M
R-2	12 ohms ½ watt, carbon	RC20AE120K
R-3, 15	150 ohms ½ watt, carbon	RC20AE151K
R-4, 54	47,000 ohms 1 watt, carbon	RC30AE473K
R-5, 9, 14, 19, 90, 103, 104	15 ohms ½ watt, carbon	RC20AE150M
R-6, 13, 17, 20	2200 ohms ½ watt, carbon	RC20AE222M
R-7, 18, 40, 67, 74, 78	1200 ohms ½ watt, carbon	RC20AE122K
R-8, 53, 66	470,000 ohms ½ watt, carbon	RC20AE474M
R-11	5.6 megohms ½ watt, carbon	RC20AE565K
R-12	Resistor, variable, SENSITIVITY control	25A548
R-16, 22, 32, 45, 70, 86, 106	1000 ohms ½ watt, carbon	RC20AE102M
R-21, 48, 107	2.2 megohms ½ watt, carbon	RC20AE225M
R-23	47 ohms ½ watt, carbon	RC20AE470M
R-24	33 ohms ½ watt, carbon	RC20AE330M
R-25, 69, 75	10,000 ohms ½ watt, carbon	RC20AE103K
R-26	5600 ohms 1 watt, carbon	RC20AE562K
R-27	470 ohms ½ watt, carbon	RC20AE471M
R-28	68,000 ohms 1 watt, carbon	RC30AE683K
R-29	120 ohms ½ watt, carbon	RC20AE121K
R-30, 42, 52, 64	1 megohm ½ watt, carbon	RC20AE105M
R-31, 60	330 ohms ½ watt, carbon	RC20AE331K
R-34	Resistor, variable, carrier level meter adjustment	25C022
R-36	1.2 megohms ½ watt, carbon	RC20AE125K
R-37	100,000 ohms 1 watt, carbon	RC30AE104K
R-38	270 ohms ½ watt, carbon	RC20AE271K
R-39, 59, 87	56,000 ohms ½ watt, carbon	RC20AE563K
R-41, 58, 79, 80, 81, 83	220,000 ohms ½ watt, carbon	RC20AE224K
R-49	330,000 ohms ½ watt, carbon	RC20AE334K
R-50	1800 ohms ½ watt, carbon	RC20AE182K
R-55	10,000 ohms 1 watt, carbon	RC30AE103K
R-56, 57, 71 94	47,000 ohms ½ watt, carbon	RC20AE473K
R-65	150,000 ohms ½ watt, carbon	RC20AE154K
R-68	5100 ohms ½ watt, carbon	RC20AE512J
R-72, 105	100 ohms ½ watt, carbon	RC20AE101K
R-73	Resistor, variable VOLUME control	25A549
R-76, 92	56 ohms ½ watt, carbon	RC20AE560K
R-77	100 ohms 2 watts, carbon	RC40AE102K
R-82	8200 ohms ½ watt, carbon	RC20AE822K
R-84	220 ohms 2 watts, carbon	RC40AE221K
R-85	2000 ohms 10 watts, wire wound	24BG202D
R-88	2.2 megohms ½ watt, carbon	RC20AE225K
R-89	68,000 ohms ½ watt, carbon	RC20AE683K
R-91, 93	4700 ohms ½ watt, carbon	RC20AE472K
R-101, 102	330 ohms ½ watt, carbon	RC20AE331M

TRANSFORMERS AND COILS

T-1	Transformer, antenna, band 6	51B829
T-2	Transformer, antenna, band 5	51B828
T-3	Transformer, antenna, band 4	51B990

SERVICE PARTS LIST

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER
T-4	Transformer, antenna, band 3	51B826
T-5	Transformer, antenna, band 1	51B823
T-6	Transformer, r-f stage, band 6	51B833
T-7	Transformer, r-f stage, band 5	51B832
T-8	Transformer, r-f stage, band 4	51B989
T-9	Transformer, r-f stage, band 3	51B987
T-10	Transformer, r-f stage, band 2	51B825
T-11	Transformer, r-f stage, band 1	51B824
T-12	Transformer, converter, band 6	51B833
T-13	Transformer, converter, band 5	51B844
T-14	Transformer, converter, band 4	51B989
T-15	Transformer, converter, band 3	51B988
T-16	Transformer, converter, band 2	51B986
T-17	Transformer, converter, band 1	51B985
T-18	Transformer, oscillator, band 6	51B839
T-19	Transformer, oscillator, band 5	51B838
T-20	Transformer, oscillator, band 4	51B991
T-21	Transformer, oscillator, band 3	51B836
T-22	Transformer, oscillator, band 2	51B835
T-23	Transformer, oscillator, band 1	51B834
T-24	Transformer, 1st I-F	50C198
T-25	Transformer, 2nd I-F	50C190
T-26	Transformer, 3rd I-F	50C373
T-27	Transformer, FM detector	50C191
T-28	Transformer, BFO	54C032
T-29	Transformer, audio output	55B077
T-30	Transformer, power (115 V. 50/60 cycles)	52C141
T-30	Transformer, power (115/230 V. 50/60 cycles)	52C131
L-1	R.F. choke, oscillator	53B008
L-2	I-F coupling coil	53B104
L-3	Choke, filter	56B067
L-4	R.F. choke, filament	53B009
L-5	R.F. choke, screen (Wound on R-95)	53A117
L-6	R.F. choke, screen (Wound on R-96)	53A117

SWITCHES

SW-1	Switch, BAND SELECTOR	60D298
SW-2	Switch, SELECTIVITY	60A234
SW-3	Switch, RECEPTION	60C235
SW-4	Switch, TONE	60C236
SW-5, 6, 7	Switch, toggle, SPST	60A138
SW-8	Switch, power, part of VOLUME control R-73	

PLUGS AND SOCKETS

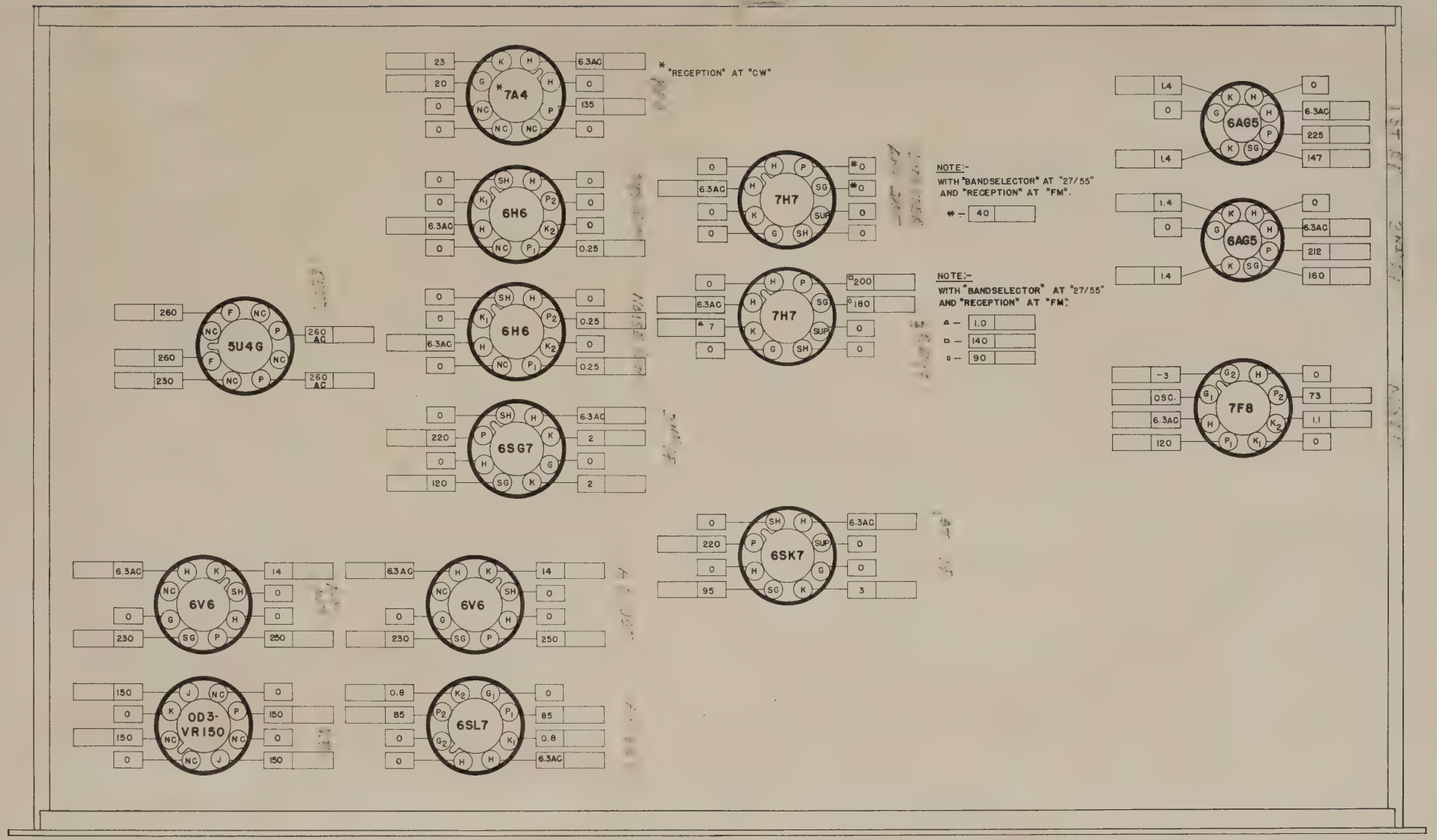
PL-1	Plug, octal, with jumpers	35A015
PL-2	Plug and cord, power	87A078
	Socket, octal (tube) bakelite	6A035
	Socket, miniature (tube) ceramic	6A193
	Socket, loktal (tube) bakelite	6A213
	Socket, loktal (tube) mica filled	6A223
	Socket, dial light, general coverage dial	6A258
	Socket, dial light, logging scale	6A259
	Socket, dial light, band-spread dial	6A260
	Socket, dial light, tuning meter	6A262
J-1	Jack, phono	36A029
J-2	Jack, phones	36B030

TUBES, RECTIFIERS AND LAMPS

	Type 6AG5, antenna	90X6AG5
	Type 6AG5, R-F amplifier	90X6AG5
	Type 7F8, oscillator-converter	90X7F8
	Type 6SK7, 1st I-F amplifier	90X6SK7
	Type 6SG7, 2nd I-F amplifier	90X6SG7
	Type 6H6, noise limiter	90X6H6
	Type 7H7, 3rd I-F amplifier	90X7H7
	Type 7H7, AM detector	90X7H7
	Type 6H6, discriminator	90X6H6
	Type 6SL7, phase inverter	90X6SL7
	Type 6V6, AF power amplifier	90X6V6
	Type 6V6, AF power amplifier	90X6V6
	Type 7A4, BFO and FM tuning meter amplifier	90X7A4
	Type OD3/VR150 Volt Regulator	90XVR150
	Type 5U4G Rectifier	90X5U4G
LM-1, 2, 3,	Lamp, 6-8 V., 250 MA., green tint	39A018
LM-4	Lamp, 6-8 V., 150 MA., green tint	39A019

MISCELLANEOUS COMPONENTS

TS-1, 2	Terminal strip, antenna-ground or speaker	88A567
	Screw, knurled head, for above terminal strip	3A1371
M-1	Meter, CARRIER LEVEL	82B100
X-1	Crystal, 455 kc	19A123
	Knob, VOLUME control	15A060
	Knob, CW PITCH or CRYSTAL PHASING control	15A061
	Knob, RECEPTION control	15A045
	Knob, SELECTIVITY control	15A063
	Knob, TONE control	15A062
	Knob, SENSITIVITY control	15A064
	Knob, BAND SELECTOR control	15A057
	Dial, micro tuning	83B243
	Knob, main tuning	15A055
	Knob, band spread	15A054
	Knob, brake	15A052
	Shield, tube (miniature tube)	69A065
	Core, powdered iron	77A068
	Dial drive assembly	71C177
	Dial, general coverage tuning	83C330
	Dial, bandspread tuning	83B328
	Escutcheon, band spread dial	7B019
	Window, bandspread dial escutcheon	22A160
	Escutcheon, general coverage dial	7D020
	Pointer, general coverage dial escutcheon	82A110
	Clip, general coverage dial escutcheon	76A364
	Clip, bandspread dial escutcheon	76A309



FRONT PANEL.

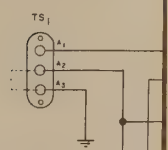
NOTE:-

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES MEASURED BETWEEN TUBE SOCKET TERMINALS AND GROUND.
3. LINE VOLTAGE — 117 V. AC.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. VOLTAGES SHOWN WERE MEASURED WITH A 20,000 OHM/VOLT METER.
6. "NC" — NO CONNECTION.
7. CONTROL SETTING — UNLESS SPECIFIED.
   "BAND SELECTOR" AT BAND 1.
   "RECEPTION" AT "AM".
   "AVC" AT ON.
   "NOISE LIMITER" OFF.
   "RECEIVE — STANDBY" AT "RECEIVE".
   "SENSITIVITY" AT MAXIMUM GAIN.
   "SELECTIVITY" AT "NORMAL / BOARD".

92D860

Fig. 3. Tube socket voltage chart.

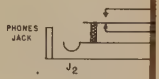
NOTE:
CONDENSERS ARE IN MFD
UNLESS OTHERWISE SPECIFIED

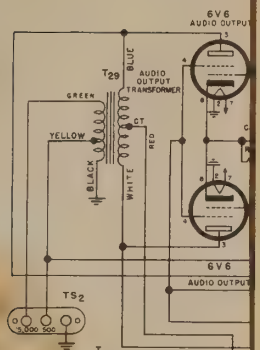


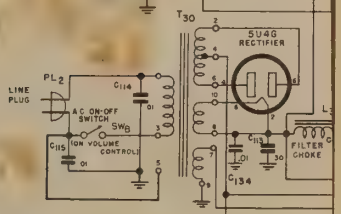
BAND SELECTOR SWITCH SW-1

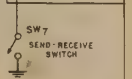
POSITION	RANGE AM
1 -	.54 TO 1.62 MC. AM
2 -	1.62 TO 5 MC. AM
3 -	5 TO 15 MC. AM
4 -	15 TO 30 MC. AM
5 -	27 TO 55 MC. AM/FM
6 -	55 TO 108 MC. AM/FM

SWITCH SHOWN IN POSITION NO. 1









TONE SWITCH SW-4

1 -	BASS
2 -	HI. FI.
3 -	MED.
4 -	LOW

SWITCH SHOWN IN BASS POSITION

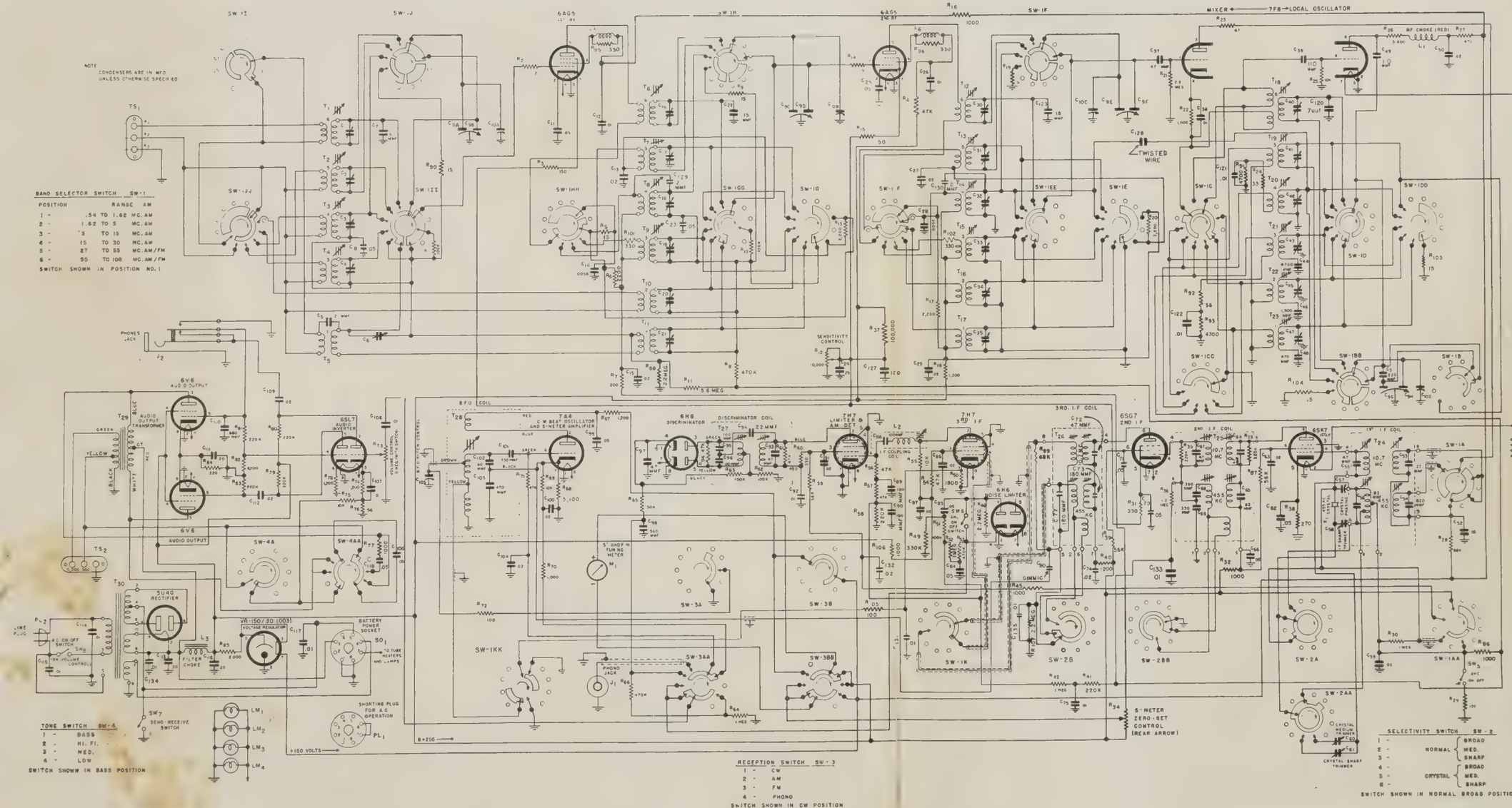


FIG. 4. SCHEMATIC WIRING DIAGRAM

VR-150/30 (OD3)
Voltage Regulator



SX-88
&
SX-88U
RUN 1

the hallicrafters co.
MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

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92-2276

HALLICRAFTERS SX-88 RECEIVER

SECTION 1.

GENERAL DESCRIPTION

The Hallicrafters SX-88 represents the ultimate in precision communications equipment. This superb twenty tube communications receiver contains virtually every feature essential for top performance, operating ease, and dependability. It offers continuous coverage from 535 kc to 33 mc and provides for the reception of AM phone, single-sideband phone, and CW signals over its entire tuning range. Electrical bandspread, calibrated for the 160, 80, 40, 20, 15, 11, and 10 meter amateur bands, provides for fine tuning on bands 2 through 6. Band changing is accomplished from the front panel of the receiver, without the use of plug-in coils.

The receiver employs dual conversion on all six bands. As a result, images are practically nonexistent, rejection varying between 60 and 120 db, depending on the band. Its 3 stage 50 kc second IF with 8 tuned circuits provides "razor sharp" selectivity ... selectivity greater than most crystal circuits because of the extreme steepness of its selectivity curve. Receiver selectivity is variable in six steps from 250 cycles to 10 kc at the "nose" and 850 cycles to 24 kc at the "skirt".

Two tuned r-f stages on all bands except the broadcast band where one stage is adequate, assures maximum sensitivity and a high signal-to-noise ratio for outstanding reception of weak signals. An antenna trimmer, adjustable from the front panel, permits peaking of the 1st r-f stage to compensate for loading effects of various antennas. Receiver sensitivity for a 10 to 1 signal-to-noise ratio measures 1 microvolt on bands 2 through 6 and 10 microvolts on band 1. A manual sensitivity control prevents overloading on strong signals.

Outstanding frequency stability is achieved by means of ceramic coil forms in the oscillator section, temperature compensation, voltage and current regulation in the 1st conversion oscillator, and the use of a crystal controlled 2nd conversion oscillator.

Tuning is accomplished by a precision anti-backlash gear-train mechanism to insure extremely close calibration and accurate resetability. The ratio of each tuning control to its associated tuning dial is 24 to 1; i.e., 24 complete revolutions are made by the control while the dial makes one complete band coverage. A logging scale on each dial, calibrated from 0 to 24, indicates the revolutions made by the control. Since the metal skirt of each control is calibrated from 0 to 100, this system of tuning makes it possible to divide each frequency band on the main and bandspread tuning dials into 2400 readable settings. A lock on each tuning dial provides positive locking action without affecting its frequency setting. Smooth flywheel tuning assures maximum traverse speed and operating ease.

A built-in 100 kc crystal calibrator provides marker signals at every 100 kc on the dial for checking the calibration accuracy. Any calibration adjustment required can be made from the front panel, by means of the adjustable dial pointers. A trimmer capacitor, accessible from the top of the chassis, permits adjustment of the calibrating crystal to exactly 100 kc by comparison with the frequencies transmitted by station WWV.

The amplified and delayed AVC circuit in the receiver functions on both AM and CW signals to keep the output level of the receiver constant regardless of input-signal variations. This type of AVC circuit is advantageous in that it provides excellent control over a wide range of signal strengths and yet maintains full receiver sensitivity on weak signals.

An automatic series noise limiter circuit, controlled by a switch on the front panel, eliminates interference from electrical equipment and other sources of pulse type noise such as ignition noise.

A tuned buffer amplifier stage isolates the beat frequency oscillator from the detector and provides for two levels of injection, low level injection for CW reception and high level injection for single-side band reception. A three-position toggle switch on the front panel permits selection of either level, and also turns the beat oscillator off for AM reception. The frequency of the beat oscillator is controlled by the Pitch control on the front panel which varies the audible beat note from zero to plus or minus 2500 cycles.

An "S" meter is used when receiving AM signals to indicate the accuracy of tuning and the relative strength of received signals. The meter is calibrated in microvolts, "S" units from 1 to 9, and in decibels above S-9 to + 40 db.

The Receive-Standby switch on the front panel silences the receiver but leaves the power on to provide instant reception between transmission periods. Provision has also been made in the receiver for remote receive-standby control, and for transmitter control with the standby switch. An auxiliary sensitivity control, located on the top of the chassis, is switched in the circuit when the receiver is in the "standby" position to permit monitoring of your transmitter signal. A neon lamp, connected across the secondary of the antenna coil, protects the receiver against possible damage from excessive r-f voltage at the antenna terminals during transmission. Protection is provided for terminal voltages up to 50 volts.

A push-pull 6V6 audio output stage with inverse feedback delivers 10 watts of audio power. Audio output connections include terminals for 3.2 and 8 ohm speakers as well as a 500/600-ohm line or speaker output. A front panel jack for headphones is also provided, and the speaker is automatically disabled when the headphones are plugged in. The response of the audio amplifying system is essentially flat from 20 to 20,000 cycles. A 5-position full range tone control provides responses for normal, communications, and full fidelity reception.

The SX-88 operates from a 105-125 volt, 50-60 cycle AC power source. The universal model, the SX-88U, operates from 25-60 cycle AC sources at voltages ranging from 100 to 250 volts. Both models also have provisions for operation from an external power supply or batteries for emergency service in areas where AC power is not available.

This receiver is certified by the FCDA under Specification M6-1, Item #R12.

SECTION 2.
INSTALLATION

2-1. UNPACKING

After unpacking the receiver, examine it closely for damage which may have occurred in transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for instructions before removing or destroying them.

CAUTION

When removing the receiver from the carton be extremely careful not to place any strain on the tuning knobs. Failure to observe this precaution may result in serious damage to the precision tuning mechanism.

2-2. LOCATION

The receiver may be placed in any location that will permit free air circulation through the ventilation holes and openings in the cabinet. Avoid excessively warm locations such as those near radiators and heating vents. The external speaker may be located in any convenient position although it is recommended that it not be placed on top of the receiver for reasons of ventilation.

If rack mounting is desired, the receiver may be removed from the cabinet by removing the two screws at each side of the front panel, the four screws at bottom of the cabinet, and then sliding the receiver out of the cabinet. The 8-3/4" x 19" front panel of the receiver has holes suitably spaced to fit the standard 19-inch radio relay rack.

2-3. ANTENNAS

The r-f input of the receiver is designed for operation from either a single-wire antenna, or a half-wave doublet or other tuned antenna with transmission line impedances from 52 to 600 ohms. Antenna connections are made to a three terminal strip at the rear of the receiver marked "A1", "A2", and "G". Mounting holes are also provided, adjacent to the antenna terminals, for installation of an AN type SO-239 connector for coaxial cable installations.

A. SINGLE WIRE ANTENNA

The simplest antenna and one which will provide satisfactory results throughout the entire tuning range is a conventional single-wire antenna, 50 to 100 feet long. This type of antenna should be erected as high as possible and kept free from surrounding objects. When using a single-wire antenna, attach the antenna lead-in to terminal "A1" and connect the jumper link between terminals "A2" and "G". In some locations, reception may be improved by connecting a ground wire between terminal "G" and a cold water pipe or outside ground rod.

B. HALF-WAVE DOUBLET

For top performance, especially on the shortwave ranges, the use of a half-wave doublet or other type of antenna employing a 52 to 600-ohm transmission line is recommended. The doublet antenna should be cut to the proper length for the most used frequency or band of frequencies. The overall length in feet of a half-wave doublet is determined by the following formula:

$$\text{Length in feet} = \frac{468}{\text{Frequency in megacycles}}$$

The doublet antenna may be fed with either a balanced or unbalanced transmission line. When a balanced transmission line such as "twin-lead" or a twisted pair is used, the two leads are connected to terminals "A1" and "A2", and the jumper link between terminals "A2" and "G" is disconnected. When using an unbalanced transmission line such as coaxial cable, the inner conductor connects to terminal "A1", the outer braid connects to "A2", and the jumper link connects between "A2" and "G".

The doublet antenna provides optimum efficiency only at the frequency for which it is cut. Therefore, it may be desirable for reception on frequencies remote from the antenna frequency to utilize the antenna as a single wire type. This is accomplished by connecting the two transmission line leads together and connecting them to terminal "A1". The jumper link in this case should be connected between terminals "A2" and "G".

In an installation where the receiver is used in conjunction with a transmitter, it may be advantageous to use the same antenna for receiving as for transmitting. This is especially true when a directive antenna is used since the directive effects and power gain of the transmitting antenna are the same for receiving as for transmitting. Switching of the antenna from the transmitter to the receiver may be accomplished with a double-pole, double-throw antenna changeover relay or knife switch connected in the antenna leads.

For further information regarding antennas, refer to the "Radio Amateur's Handbook" or the "A.R.R.L. Antenna Book", both published by the American Radio Relay League; West Hartford, Conn., U.S.A.

CAUTION: When using the SX-88 receiver in close proximity to transmitting equipment, avoid excessive r-f voltage at the antenna terminals of the receiver during transmission. Nearby antennas or even short lengths of transmission line between the receiver and antenna relay can pick up high r-f potentials. Voltages in excess of 50 volts at the receiver antenna terminals can destroy the protective neon lamp and antenna stage coils.

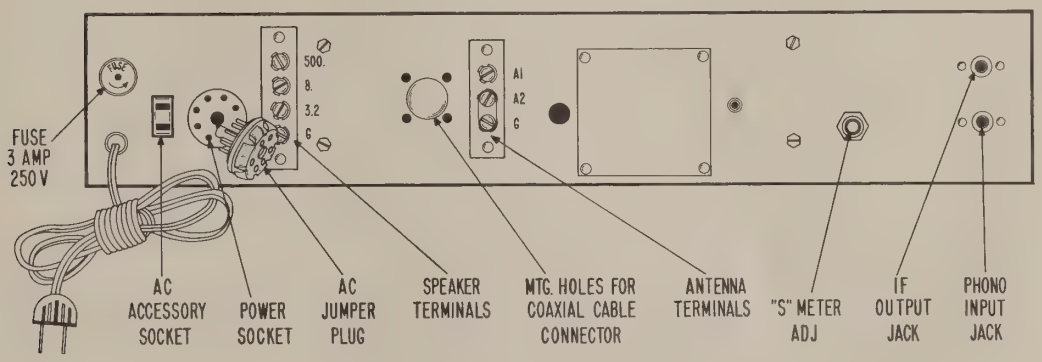


Fig. 1. Rear View of Receiver

2-4. POWER SOURCE

The SX-88 receiver is designed for operation on 105-125 volt, 50-60 cycle AC current while the universal model, the SX-88U, operates on 100-250 volt, 25-60 cycle AC current. The normal power consumption of each receiver is 138 watts. Each receiver is also equipped with a DC power input socket to permit operation on an external power supply or batteries for portable or emergency service in areas where AC power is not available. This socket is located at the rear of the receiver and is marked "POWER SOCKET". In addition to equipping the receiver for DC operation, the POWER SOCKET also supplies 300 volts DC at 10 ma between pins 1 and 3, and 6.3 volts AC at .6 amp between pins 1 and 6 for operating accessories.

A. AC OPERATION

Insert the line cord plug into any convenient AC power outlet of the proper rating. If in doubt about your power source, call your local power company before plugging in the receiver.

CAUTION: When operating the SX-88U, it is essential that the power selector switch (located on the rear of the power transformer) be set for the voltage at the AC outlet before plugging in the receiver. Failure to observe this precaution may result in serious damage.

NOTE: The receiver will not operate from an AC source unless the AC JUMPER PLUG is inserted in the POWER SOCKET at the rear of the receiver. (See Fig. 1.)

B. DC OPERATION

The receiver may be operated from an external DC source, such as a vibrator power supply or batteries, by removing the AC JUMPER PLUG normally located in the POWER SOCKET at the rear of the receiver, and replacing it with a similar octal plug wired as shown in Fig. 2. Note that pins 7 and 8 of the DC plug are connected together by a jumper wire so that the 4H4 current regulator tube is automatically disconnected to supply the correct heater voltage to the 6U8 tube when operating from an external 6-volt source. The voltage and current requirements for DC operation are as follows: "B" supply, 300 volts at 200 ma; "A" supply, 6 volts at 6 amps.

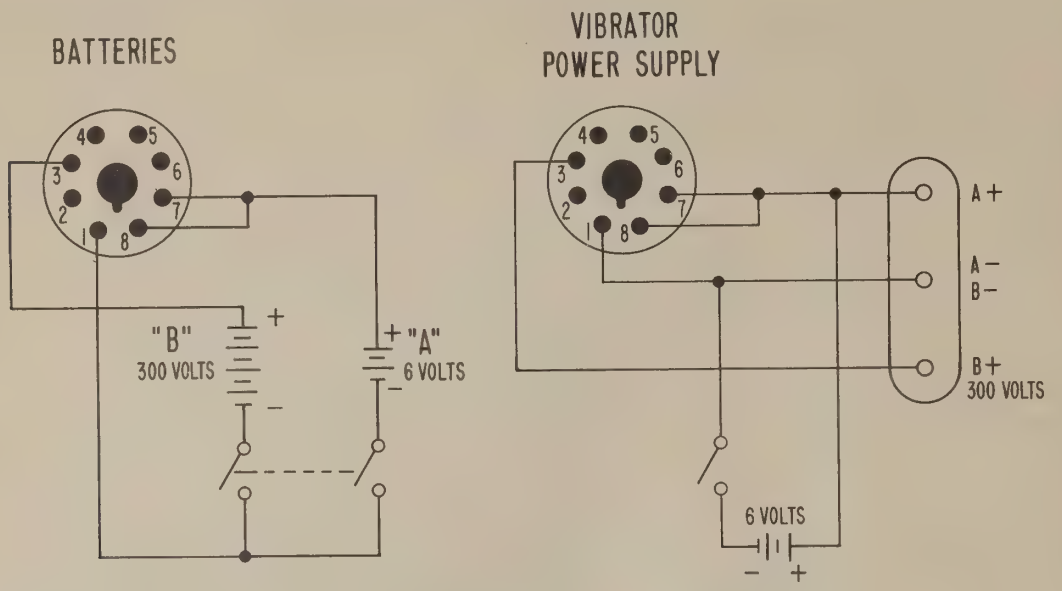


Fig. 2. Wiring Diagram for DC Operation

2-5. SPEAKER CONNECTION

A four-terminal strip, marked "G-3.2-8-500", is provided at the rear of the receiver for the speaker connections. Approximately 10 watts of audio power are available at these terminals. Any speaker having an impedance of either 3.2 or 8 ohms can be used with the receiver by simply connecting one lead from the speaker to the common ground terminal marked "G" and the other lead to the numbered terminal which corresponds to the speaker voice coil impedance. For optimum results, the use of the Hallicrafters R-46 or R-46A speaker is recommended. The R-46 speaker has a built-in matching transformer and connects to terminals "G" and "500" while the R-46A, which has no matching transformer, connects to the terminals marked "G" and "3.2". When using a speaker with an impedance other than 3.2 or 8 ohms, a matching transformer should be used to insure optimum performance. The matching transformer should have a 10-watt power rating, a 500-ohm primary impedance, and a secondary impedance to match the impedance of the speaker being used.

2-6. HEADPHONES

The headphone jack, marked PHONES, is located on the front panel of the receiver and is wired so that the speaker is automatically disabled when the headphones are plugged in. The headphone output load impedance is not critical and any commercial type headphones may be used, including crystal types as no direct current flows in the headphone circuit. For maximum headphone output, the use of high-impedance magnetic or crystal phones is recommended.

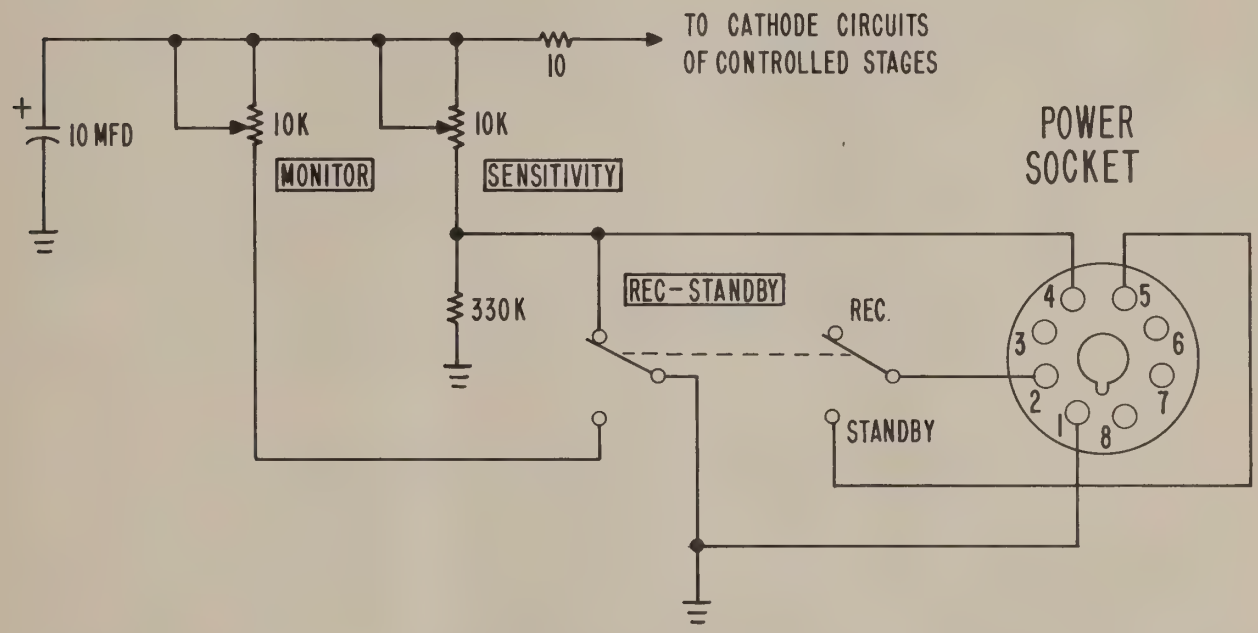
2-7. RECORD PLAYER CONNECTIONS

An audio input jack, marked PHONO, is provided at the rear of the receiver for attachment of a record player using either a crystal pickup, or a magnetic pickup with a suitable pre-amplifier. Connection to the PHONO jack is made with a standard single-pin phono plug. Shielded type cable should be used to prevent hum, connecting the inner conductor to the center prong of the plug, and the outer metal braid to the shell of the plug.

For phono operation, set the BAND WIDTH control on the front panel at "PHONO" and operate the VOLUME and RESPONSE controls as explained under Sections 3-7 and 3-12. The remaining controls are inoperative and will have no effect on phono operation.

2-8. RELAY AND TRANSMITTER SWITCHING

One half of the dpdt REC-STANDBY switch on the front panel connects to pins 2 and 5 of the POWER SOCKET at the rear of the receiver, and is available for transmitter switching. (See Fig. 3) This half of the switch is wired so that it is closed when the REC-STANDBY switch is set at "STANDBY" and open when set at "REC". To reverse the switching sequence (i.e., to have the switch open when the REC-STANDBY switch is set at "STANDBY" and closed when set at "REC") disconnect the lead on the switch which connects to pin 5 of the POWER SOCKET and connect it to the unused terminal on the switch.



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Fig. 3. Schematic Diagram of Sensitivity and Monitor Control Circuits, and Rec-Standby Circuit.

2-9. REMOTE REC-STANDBY SWITCH

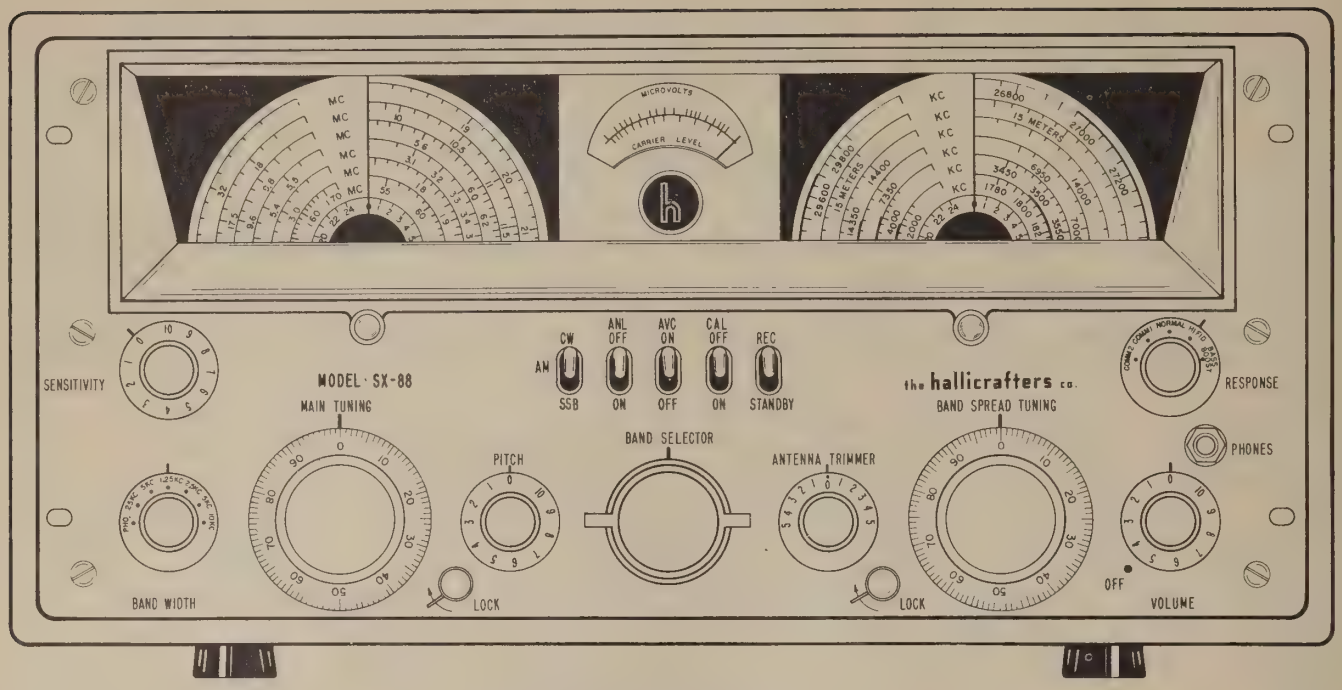
The receiver may be disabled remotely by connecting a remote spst switch between pins 1 and 4 of the AC JUMPER PLUG located in the POWER SOCKET at the rear of the receiver. (See Fig. 3). To operate the receiver from a remote location, set the REC-STANDBY switch on the front panel at "STANDBY" and use the remote switch to place the receiver in "receive" or "standby" operation.

2-10. AC ACCESSORY OUTLET

An AC outlet is provided at the rear of the receiver for operating a record player, oscilloscope, or accessories.

2-11. IF OUTPUT JACK

The IF OUTPUT jack at the rear of the receiver provides a low impedance cathode follower output at the second intermediate frequency of 50 kc for feeding a teletype converter, oscilloscope, etc. The i-f output signal is obtained from the grid of the 3rd 50 kc IF amplifier, amplified by the AVC amplifier, coupled to the cathode follower, and then fed through a DC blocking capacitor to the IF OUTPUT jack. The IF OUTPUT jack will be operative only if the AVC switch is set at "ON".



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Fig. 4. Operating Controls

SECTION 3.
FUNCTION OF OPERATING CONTROLS

3-1. SENSITIVITY CONTROL

The SENSITIVITY control varies the gain of the 1st and 2nd RF amplifier stages and the 1st, 2nd, and 3rd 50 kc IF amplifier stages. Maximum sensitivity is obtained with the control set at "10" (fully clockwise). In this position, the tubes being controlled are operated at maximum gain with minimum cathode bias. As the control is rotated counterclockwise, the bias on the tubes increases with a resultant decrease in gain.

3-2. CW-AM-SSB SWITCH

This switch, when set at "CW" or "SSB", applies plate voltage to the beat frequency oscillator (BFO) to render it operative for the reception of CW or single-sideband signals. The beat frequency oscillator employs a Hartley oscillator circuit and is voltage regulated to insure highly stable operation. Oscillator look-in is eliminated since the output of the beat oscillator is coupled to the second-detector through a tuned buffer amplifier. When the CW-AM-SSB switch is set at "SSB", the cathode bias resistor of the BFO buffer amplifier tube is decreased in value, thus providing increased BFO output for proper reception of single-sideband signals. The "AM" position of the CW-AM-SSB switch disables the BFO for normal reception of standard broadcast and AM phone signals.

3-3. ANL SWITCH

This switch, when set at "ON", places the automatic series noise limiter circuit in operation to reduce pulse type noise such as ignition noise and electrical interference. The limiter circuit allows the signal to pass through the receiver unaffected, but makes the receiver inoperative for noise amplitudes greater than those of the signal. It will work equally well on AM or CW signals and is self-adjusting, i.e., it automatically adjusts itself to the signal level.

The noise limiter circuit "chops" noise peaks received at the detector by means of a biased diode which becomes nonconducting above a predetermined signal level. The audio output of the detector must pass through the limiter diode to the grid of the audio amplifier when the limiter circuit is in operation. The limiter diode normally acts as a conductor for the audio signal as long as the diode plate is positive

with respect its cathode. When a noise peak is higher in amplitude than the signal, it instantaneously swings the plate negative with respect to the cathode, conduction ceases, and that portion of the signal is automatically cut off from the audio amplifier. The point at which the limiter diode becomes non-conducting is made sufficiently high so that the diode will not clip modulation peaks and thus impair intelligibility appreciably, but low enough to limit the noise peaks effectively.

3-4. AVC SWITCH

The AVC switch, when set at "ON", places the AVC circuit in operation to maintain the output level of the receiver constant regardless of normal input-signal variations. AVC voltage is applied to the 1st and 2nd RF amplifier stages, 2nd mixer, and 1st 50 kc IF stage. Since delayed AVC is employed in the receiver, the AVC circuit does not come into operation (i.e., it is delayed) until the carrier strength reaches a pre-determined level. The result is that no AVC voltage is applied to the grids of the controlled stages until the required carrier strength is reached. With this arrangement, the AVC bias on the controlled tubes is zero until the peak voltage applied to the plate of the AVC diode exceeds the delay voltage applied to its cathode. Thus, the AVC circuit offers very effective control on average and strong signals and yet maintains full receiver sensitivity on weak signals.

In the conventional AVC circuit, which uses the rectified carrier voltage developed at the detector, the use of AVC for CW reception results in a loss of sensitivity when the BFO is switched on. This occurs because the beat oscillator output acts exactly as a strong received signal, and causes the AVC circuit to put high bias on the controlled stages, thus reducing the receiver sensitivity. In the SX-88 receiver, this undesirable effect is eliminated by completely isolating the AVC circuit from the second detector by means of an AVC amplifier stage which obtains its input signal ahead of the detector stage, (and BFO), thus permitting the reception of CW signals with AVC functioning.

3-5. CAL. OFF-ON SWITCH

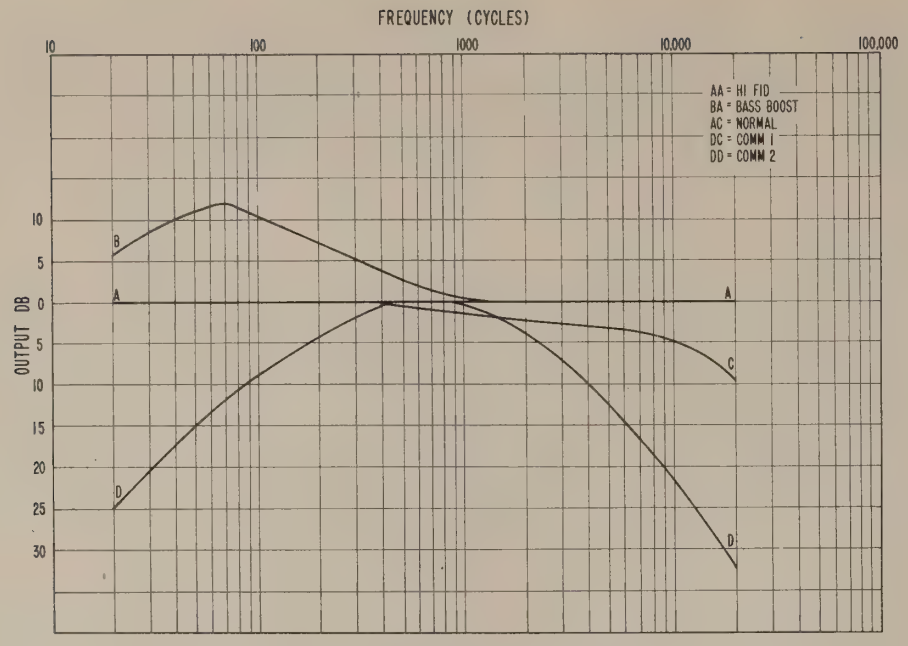
The CAL. OFF-ON switch controls the operation of the built-in crystal calibrator. When the switch is set at "ON", the crystal calibrator is turned on to provide marker signals at every 100 kc on the dial for checking the dial calibration accuracy. The crystal calibrator employs a crystal controlled, pentode oscillator circuit. The output of the crystal calibrator is capacitively coupled to the antenna input circuit. A trimmer capacitor, adjustable by the CRYSTAL ADJ control on the top front of the chassis, permits adjustment of the calibrating crystal to exactly 100 kc by comparison with the frequencies transmitted by WWV. This capacitor has been set at the factory and should normally not require periodic readjustment unless extreme calibration accuracy is required. If adjustment is required, proceed as outlined in Section 7-7.

3-6. REC-STANDBY SWITCH

The REC-STANDBY switch, normally set at "REC", permits disabling of the receiver during transmission periods, at the same time maintaining the heater and plate supplies operative for instant use when reception is again resumed. The receiver is disabled by setting the REC-STANDBY switch at "STANDBY".

> **NOTE:** When the REC-STANDBY switch is set at "STANDBY", the receiver may still be made operative, if desired, by means of the MONITOR control on the top rear of the chassis. This permits monitoring of your own transmitter signal when the REC-STANDBY switch is being used to control the transmitter. Only when the MONITOR control is rotated fully counterclockwise (zero sensitivity position) will the receiver be completely disabled when the REC-STANDBY switch is set at "STANDBY".

One section of the REC-STANDBY switch may be used for relay or transmitter switching, if desired. For connections and details, refer to Section 2-8.



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Fig. 5. Audio Response Curves

3-7. RESPONSE CONTROL

The RESPONSE control varies the frequency characteristics of the receiver audio system. The five types of response available are BASS BOOST, HI FID, NORMAL, COMM 1, and COMM 2. For broadcast reception and phono operation, the BASS BOOST and HI FID positions are recommended while for the reception of CW and AM phone signals, where intelligibility rather than fidelity is the primary concern, the NORMAL, COMM 1, and COMM 2 positions are usually more desirable. Fig. 5 shows the frequency characteristics obtained with the control set in each of its five positions.

A. HI FID (High Fidelity)

This position provides an essentially flat response from 20 to 20,000 cycles, thereby providing as near true reproduction of the original signal as possible. This position is recommended for high fidelity reproduction of AM broadcast programs, tapes, and records.

B. BASS BOOST

In this position, the response at the high frequency end of the audio range remains the same as in the "HI FID" position; however, the level of the low audio frequencies is boosted approximately 10 db above that of the mid and high audio frequencies.

C. NORMAL

In this position, the response is essentially flat at the low and mid-frequencies and slightly attenuated at the high frequencies. The "NORMAL" position may be used to improve the signal-to-noise ratio when excessive background noise or static is experienced.

D. COMM 1 & COMM 2

These positions are especially useful for communication work under sharp selectivity conditions (BAND WIDTH control set at ".25 KC" or ".5 KC"). The "COMM 1" and "COMM 2" provide attenuation at both the high and low frequency ends of the audio range. The response in the two positions differs only in the amount of attenuation at the high frequency end, the "COMM 2" position providing considerably greater attenuation than the "COMM 1" position.

3-8. BAND WIDTH CONTROL

The BAND WIDTH control is used to vary the selectivity of the receiver to fit receiving conditions. Six degrees of Selectivity are available, ranging from 250 cycles, for CW reception under crowded band conditions, to 10 kilocycles for maximum fidelity for broadcast reception. The six selectivity positions are shown on the BAND WIDTH control and indicate receiver selectivity at 6 db down. A seventh position on the control, marked "PHONO", disables all of the receiver circuits except the audio system for phonograph operation.

For broadcast reception, the BAND WIDTH control is normally set at "5 KC" or "10 KC", the positions affording broad selectivity. Selectivity may be progressively increased by turning the BAND WIDTH control to the positions marked "2.5 KC", "1.25 KC", ".5 KC", and ".25 KC". For reception of the crowded amateur and shortwave bands, it is generally advisable to sacrifice fidelity for greater selectivity, since the added selectivity reduces both adjacent-channel interference and background noise by attenuating the higher audio frequencies. Too much selectivity on AM signals, however, will attenuate the high audio frequencies to such an extent that the signal may become unintelligible as a result of excessive side-band cutting. When receiving CW signals, the sharpest selectivity position may be used without the loss of intelligibility experienced in AM reception.

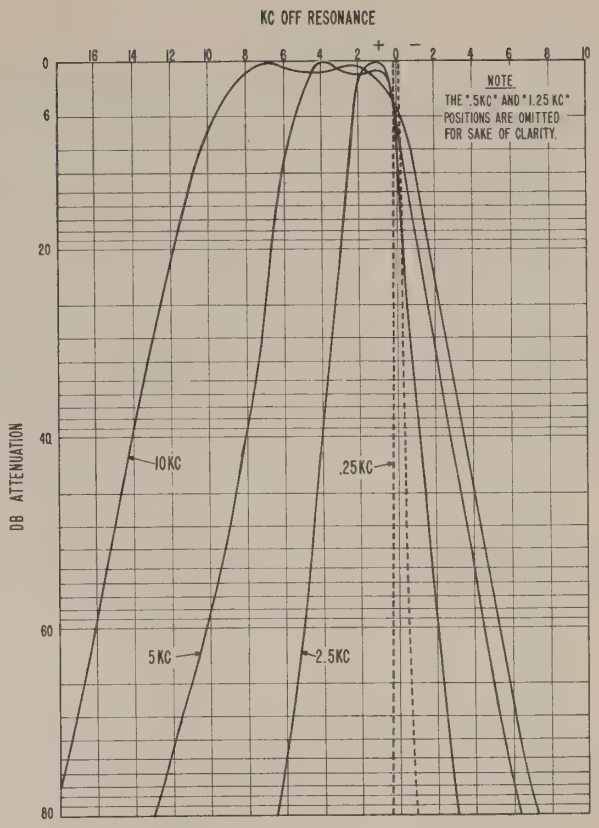


Fig. 6. IF Selectivity Curves

3-9. PITCH CONTROL

The PITCH control operates the tuning slug in the BFO coil to vary the frequency of the beat frequency oscillator approximately 2.5 kc each side of its center frequency of 50 kc. The primary function of the PITCH control is to vary the pitch of the audible beat note when receiving CW signals. It is also used when receiving single-side band signals to vary the frequency of the reinserted carrier in the receiver.

3-10. BAND SELECTOR CONTROL

The BAND SELECTOR control operates the band switch to select the desired band of frequencies. The frequency range or band covered by each position of the BAND SELECTOR control is indicated directly on the control. The band in use on the main tuning and band spread tuning dials is illuminated for ease in tuning.

The BAND SELECTOR control performs three functions on each band: (1) it places the proper set of coils and sections of the main and band spread tuning capacitors into the circuit to cover the desired frequency range. (2) it selects the bias resistor in the cathode circuit of the 2nd RF amplifier stage to provide the proper gain for each band, and (3) it switches the 2nd conversion oscillators and 1st mixer plate to operate at the required first intermediate frequency (2075 kc on bands 1, 3, 4, 5, and 6; 1550 kc on band 2).

3-11. ANTENNA TRIMMER CONTROL

The ANTENNA TRIMMER control operates a variable capacitor connected across the secondary of the antenna coil of the band in use. This capacitor adjustment compensates for loading effects of various types of antenna installations.

3-12. VOLUME CONTROL

The VOLUME control adjusts the audio level at the speaker terminals and phones jack and, in addition, turns the receiver on and off. Clockwise rotation of the control turns the receiver on and increases the signal applied to the grid of the audio amplifier tube, thus increasing the receiver volume.

3-13. MAIN TUNING DIAL

The main tuning dial has six calibrated scales and a 24-division logging scale. Each division on the logging scale represents one complete revolution of the MAIN TUNING control. Since the metal skirt of the MAIN TUNING control is calibrated from 0 to 100, this method of tuning divides each scale on the main tuning dial into 2400 readable settings. Thus, by recording the settings of the logging scale and MAIN TUNING control, the receiver may be accurately reset to any desired frequency. A tuning lock to the right of the MAIN TUNING control permits positive locking action without affecting the frequency setting of the main tuning dial. To lock the main tuning dial, simply turn the locking knob clockwise.

IMPORTANT: The calibration on the main tuning dial will be accurate only if the band spread tuning gang is set at minimum capacity. This is accomplished by rotating the BAND SPREAD TUNING control counterclockwise until the dial pointer is aligned with the index marks at the high frequency end of the dial. If the band spread tuning gang is set at any setting other than minimum capacity, the additional band spread capacity, added to the main tuning capacity, would throw off the main tuning dial calibration because the receiver is calibrated with the band spread tuning gang set at minimum capacity.

The dial settings for the amateur bands are indicated on the main tuning dial by white dots and wavelength in meters (160, 80, 40, etc.). When tuning the amateur bands with the band spread dial, the main tuning dial must be set and locked at the setting corresponding to the desired amateur band.

3-14. BAND SPREAD TUNING DIAL

The band spread tuning dial contains a 24-division logging scale and six scales calibrated for the 160, 80, 40, 20, 15, and 11-10 meter amateur bands. The six scales are calibrated to read receiver frequency directly when the main tuning dial has been set to the index dot of the desired amateur band. If precise calibration accuracy is desired on the amateur bands, the main tuning dial should be more accurately set the means of the built-in 100 kc crystal calibrator as outlined in Section 4-4A, "Calibration of the Band Spread Dial".

Each division of the 24-division logging scale on the band spread dial represents one complete revolution of the BAND SPREAD TUNING control. Since the metal skirt of the BAND SPREAD TUNING control is calibrated from 0 to 100, this method of tuning divides each scale on the band spread dial into 2400 readable settings. Thus, by recording the settings of the logging scale and the BAND SPREAD TUNING control, the receiver may be accurately reset to any desired frequency. A tuning lock to the left of the BAND SPREAD TUNING control permits positive locking action without affecting the setting of the band spread tuning dial. To lock the band spread tuning dial, simply turn the locking knob clockwise.

In addition to its use on the amateur bands, the band spread tuning dial may also be utilized as a fine tuning adjustment over any portion of the frequency range on bands 2, 3, 4, 5, and 6. Fine tuning is accomplished as follows:

(a) Set the band spread tuning gang at minimum capacity by rotating the BAND SPREAD TUNING control counterclockwise until the dial pointer is aligned with the index marks at the high frequency end of the dial.

(b) Set the main tuning dial at the high frequency end of the range of frequencies to be covered and then slowly tune through the range using the BAND SPREAD TUNING control.

3-15. MONITOR CONTROL

The MONITOR control on the top rear of the chassis permits adjustment of the receiver sensitivity when monitoring your own transmitter signal. The MONITOR control is an auxiliary sensitivity control switched in the circuit only when the REC-STANDBY switch is set at "STANDBY"; it replaces the SENSITIVITY control on the front panel which is switched out of the circuit during standby operation. When monitoring your transmitter signal, the receiver antenna should be disconnected by relay or switching device so the signal will not "block" or damage the receiver. As a further precaution against overloading, the MONITOR control should not be advanced any further than necessary to hear the transmitter signal. When it is not desired to monitor the transmitter signal, the MONITOR control should be set fully counterclockwise (zero sensitivity position) so that the receiver will be completely disabled when the REC-STANDBY switch is set at "STANDBY".

SECTION 4.
OPERATION

4-1. AM RECEPTION

1. Set the front panel controls to their starting positions as outlined below.

VOLUME	OFF
BAND SELECTOR	At the desired band. (Band in use will be illuminated when receiver is turned on.)
SENSITIVITY	10 (maximum sensitivity)
BAND WIDTH	5 KC (2.5 KC or 10 KC if desired)
CW-AM-SSB	AM
ANL OFF-ON	OFF
AVC ON-OFF	ON
CAL OFF-ON	OFF
REC-STANDBY	REC
ANTENNA TRIMMER	0 (zero)
RESPONSE	NORMAL (or as desired)

2. Loosen the tuning locks at the sides of the MAIN TUNING and BAND SPREAD TUNING controls by turning the LOCK knobs counterclockwise.

IMPORTANT

Before making any tuning adjustments with the MAIN TUNING or BAND SPREAD TUNING controls, it is essential that the dial pointers be properly indexed by means of the small knob located directly below each dial. This is accomplished by rotating the MAIN TUNING and BAND SPREAD TUNING controls fully clockwise and aligning the dial pointers with the index marks at the low frequency end of the dial.

3. Turn the receiver on by rotating the VOLUME control clockwise. The band in use on the main tuning and band spread tuning dials will light up indicating the receiver is operative. Adjust the VOLUME control for the desired volume level.

4. Set the band spread tuning gang at minimum capacity by rotating the BAND SPREAD TUNING control counterclockwise until the dial pointer is aligned with the index marks at the high frequency end of the dial. The band spread tuning dial may now be locked in position, if desired, to avoid disturbing its setting. The band spread tuning dial is calibrated for the 160, 80, 40, 20, 15, and 11-10 meter amateur bands. For convenience in tuning, the AM phone bands are indicated on the band spread dial by a wide line directly above their location on the dial. For fine tuning of the amateur and shortwave bands with the BAND SPREAD TUNING control, see Section 3-14. The BAND SPREAD TUNING control has no effect on standard broadcast reception (Band 1).

IMPORTANT

The frequency calibration of the main tuning dial will be correct only if the band spread tuning gang is set at minimum capacity as specified above.

5. Tune in the desired signal with the MAIN TUNING control, tuning for maximum indication on the "S" meter. The dial calibrations on all bands are located above the frequency markings. After the signal has been accurately tuned in, adjust the ANTENNA TRIMMER control for maximum indication on the "S" meter, and then set the VOLUME control for the desired volume level.

NOTE

The "S" meter indications will be correct only when the AVC switch is set at "ON", and the SENSITIVITY control is set at 10 (maximum sensitivity setting). If the SENSITIVITY control is set at a setting other than "10", AVC action will also be somewhat restricted.

6. Set the BAND WIDTH control for the desired degree of selectivity. For standard broadcast reception (Band 1), the control is normally set at "10 KC" for maximum fidelity. The positions marked "5 KC", "2.5 KC", "1.25 KC", ".5 KC", and ".25 KC" provide progressively increasing steps of selectivity. Note that as the selectivity of the receiver is increased, the background noise and interference from adjacent signals is reduced. Too much selectivity, however, will cause excessive side-band cutting. While side-band cutting reduces fidelity, it may be frequently preferable to sacrifice naturalness of reproduction in favor of communications effectiveness. When changing the position of the BAND WIDTH control from a broad to a narrower response (for example: from "2.5 KC" to "1.25 KC"), a slight readjustment of the tuning controls may be necessary to recenter the signal in the i-f pass-band.

7. Set the RESPONSE control for the desired tonal quality.

8. If it is desired to operate with AVC off, set the AVC switch at "OFF", set the VOLUME control to a well advanced position, and vary the receiver volume level by means of the SENSITIVITY control to avoid "blocking" by strong signals.

9. If severe electrical disturbances or ignition or other types of pulse-type noise interfere with reception, set the ANL switch at "ON" to place the automatic noise limiter circuit in operation.

10. The receiver may be disabled without turning it off by setting the REC-STANDBY switch at "STANDBY". In this position, the r-f and i-f stages are cut off but the heater and plate supplies remain operative for instant reception. To resume reception, simply return the switch to the "REC" position.

4-2. CW RECEPTION

For CW reception, set the VOLUME control at a well advanced position and vary the volume level of the receiver by means of the SENSITIVITY control, taking care not to advance the control to a point where strong signals will cause excessive "thumping" (overloading). The receiver may be operated with AVC on or off, as desired. (See Section 3-4.) Operation of the receiver with AVC on is highly desirable since it not only minimizes fading but also prevents blasting when tuning from a weak to a strong signal.

CW signals are made audible by the heterodyning action of the beat oscillator with the incoming signal. The beat oscillator is set at a frequency slightly different from the second-intermediate frequency of 50 kc, the difference being equal to the pitch of the audible note desired. To adjust the beat oscillator frequency, first tune in a steady, unmodulated carrier with the beat oscillator turned off (CW-AM-SSB switch set at "AM"), the AVC switch set at "ON", and the BAND WIDTH control set at ".25 KC" (the sharpest selectivity position). If desired, the built-in crystal calibrator may be used as the signal source as it provides a suitable carrier at every multiple of 100 kc on the dial. The crystal calibrator is made operative by setting the CAL OFF-ON switch at "ON". Adjust the receiver tuning to the carrier frequency as indicated by a maximum indication on the "S" meter. (This centers the carrier in the i-f passband.) Then turn on the beat oscillator by setting CW-AM-SSB switch at "CW" and adjust its frequency by means of the PITCH control (leaving the receiver tuning unchanged) to give a pleasing beat note. The beat oscillator may be set on either the high- or low-frequency side of zero beat. (The beat oscillator operates on the high side when the PITCH control is set at a position to the right of "0", and on the low side when the PITCH control is set at a position to the left of "0".) After the PITCH control is set, turn off the crystal calibrator by setting the CAL OFF-ON switch at "OFF", tune in a CW signal, and adjust the ANTENNA TRIMMER control for maximum loudness. With the receiver in the sharpest selectivity position, CW signals will drop in and out rapidly as the receiver is tuned across a band, and a slow rate of tuning is highly desirable. Once the PITCH control has been set, it need not be reset for each CW signal.

NOTE

If a CW signal is tuned in with the BAND WIDTH control at a setting other than ".25 KC", it may be necessary to slightly readjust the receiver tuning when changing to a narrower response in order to properly position the signal in the i-f pass-band.

The setting of the BAND WIDTH control for CW reception is generally best determined by receiving conditions. Note that as the selectivity of the receiver is increased (BAND WIDTH control varied in steps from the "10 KC" to the ".25 KC" position), the background noise and adjacent-channel interference is considerably reduced. For CW reception, the sharpest selectivity position may be used without loss of intelligibility experienced in AM reception.

The RESPONSE control and automatic noise limiter (ANL) circuit can be used to great advantage on CW reception, just as on AM reception, to reduce the effects of background noise and electrical interference. For CW reception, the "COMM 1" and "COMM 2" positions of the RESPONSE control can prove very effective in improving the signal-to-noise ratio by attenuating both the lower and higher audio frequencies. Maximum attenuation of these frequencies is obtained with the RESPONSE control set at "COMM 2".

4-3. SINGLE SIDEBAND RECEPTION

Single-sideband signals are transmitted with little or no carrier, and it is necessary to reinsert the carrier in the receiver before proper reception is obtained. In the SX-88 receiver, this is accomplished in the 50 kc i-f system by injecting the beat oscillator signal at the input of the second-detector. A single-sideband signal can be identified by its unintelligibility, and by a severe variation in the "S" meter indication corresponding to the speech modulation.

For single-sideband reception, set the AVC switch at "ON", the CW-AM-SSB switch at "SSB", RESPONSE control at "COMM 1" or "COMM 2", and the BAND WIDTH control at either "1.25 KC" or "2.5 KC", depending upon adjacent-channel interference and noise. Set the SENSITIVITY control at a well advanced position and vary the receiver volume level by means of the VOLUME control. Initially set the PITCH control at either "0", or the position marked "4" to the right of "0". The single-sideband signal will be intelligible at only one of these two settings, the proper setting depending upon the sideband being transmitted. If the signal is not intelligible after tuning is completed as outlined below, set the PITCH control to the other setting and repeat the tuning procedure.

Tune in the single-sideband signal for maximum loudness with as good intelligibility as possible. (This centers the signal in the i-f passband.) After the signal is properly tuned in, adjust the ANTENNA TRIMMER control for maximum loudness and then very carefully adjust the PITCH control for best intelligibility. If the PITCH control is improperly set, the speech will sound high- or low-pitched, or very distorted. Best intelligibility will be obtained with the PITCH control set very close to its initial setting, usually not more than 1/2 division on either side of the initial setting.

The "1.25 KC" position of the BAND WIDTH control permits reception of modulating frequencies up to about 1500 cycles. For reception of modulating frequencies higher than 1500 cycles, set the BAND WIDTH control to the positions marked "2.5 KC", "5 KC", or "10 KC", depending on the degree of fidelity desired; maximum fidelity is obtained in the "10 KC" position.

4-4. USE OF CRYSTAL CALIBRATOR

The built-in 100 kc crystal calibrator permits accurate dial calibration over any portion of the main and band spread tuning dials by a comparison of the dial calibrations with the marker signals which appear at every multiple of 100 kc on the dial. Any calibration adjustment required can be made by adjustment of the dial pointer from the front of the receiver.

IMPORTANT

Before making any calibration adjustment, it is essential that the main tuning and band spread tuning dial pointers be properly indexed. This is accomplished by rotating the MAIN TUNING and BAND SPREAD TUNING controls fully clockwise and aligning the dial pointers with the index marks at the low frequency end of the dial by means of the small knob located directly below each dial.

A. CALIBRATION OF THE BAND SPREAD DIAL

1. Set the band spread tuning dial at a convenient multiple of 100 kc at the high frequency end of the band in use. For example: 2000 kc on 160M, 4000 kc on 80M, 7300 kc on 40M, 14,400 kc on 20M, 21,500 kc on 15M, and 29,800 on 10M. (The band spread tuning dial is calibrated in kc.)

2. Set the main tuning dial to the index dot of the desired amateur band.

3. Set the CW-AM-SSB switch at "CW", the PITCH control at "0", and the CAL OFF-ON switch at "ON".

4. Very carefully adjust the MAIN TUNING control for exact frequency as indicated by "zero beat" and then lock the main tuning dial in place to avoid disturbing its setting. The band spread tuning dial is now accurately calibrated and a "zero beat" should be obtained at every multiple of 100 kc on the band in use. For example, on the 80 meter amateur band, a "zero beat" should be obtained at 3500, 3600, 3700, 3800, 3900, and 4000 kc.

5. The procedure outlined in Steps 1 through 4 above provides average calibration accuracy over the entire frequency range of the band in use. For precise calibration accuracy over a particular section of the band, the procedure is identical except that the band spread dial is set at a multiple of 100 kc near the desired frequency or range of frequencies, instead of at the high end of the band as in Step 1.

B. CALIBRATION OF THE MAIN TUNING DIAL

1. Turn the BAND SPREAD TUNING control counterclockwise until the dial pointer is aligned with the index marks at the high frequency end of the dial. Then lock the band spread dial in place to avoid disturbing its setting.

2. Set the main tuning dial at a convenient multiple of 100 kc near the desired frequency or range of frequencies. (The main tuning dial is calibrated in mc.) To determine the nearest 100 kc multiple, simply remember that 100 kc is equal to one-tenth mc. For example, from 2.0 to 3.0 mc on band 2, the 100 kc multiples are 2.0 mc, 2.1 mc, 2.2 mc, 2.3 mc, etc.

3. Set the CW-AM-SSB switch at "CW", and the PITCH control to "0". Then set the CAL OFF-ON switch at "ON" and very carefully adjust the MAIN TUNING control for a "zero beat". After "zero beat" is obtained, very carefully index the main tuning dial pointer (by means of the small knob directly below the dial) with the nearest 100 kc multiple on the dial.

4-5. USE OF "S" METER

The "S" meter provides a visual means of determining whether or not the receiver is properly tuned, as well as an indication of the relative signal strength. The "S" meter circuit consists of a DC milliammeter connected in series with the plate lead to the 1st RF amplifier tube, the grid of which is controlled by AVC voltage. Since the plate current of this tube varies with the strength of the incoming signal, the meter will indicate relative signal strength. The "S" meter is calibrated in microvolts, "S" units from 1 to 9, and in decibels above S-9 to + 40 db. The indications on the "S" meter will be correct only when the SENSITIVITY control is set at "10" (maximum sensitivity), and the AVC switch is set at "ON".

The limitations of the microvolt scale should be fully appreciated before any assumption as to the indicated signal voltages is accepted. The meter has been calibrated in microvolts of signal strength as developed at the antenna input terminals when terminated in a 52-ohm load, on bands 2 and 3. The microvolt scale will be somewhat less accurate under other load conditions and on bands 1, 4, 5, and 6.

4-6. SERVICE OR OPERATING QUESTIONS

For further information concerning operation or servicing of your receiver, contact your Hallicrafters dealer. The Hallicrafters Co. maintains an extensive system of Authorized Service Centers where any required service can be performed promptly and efficiently at a nominal charge. For the location of the one nearest you, consult your local dealer or telephone directory. Make no service shipments to the factory as the Hallicrafters Co. will not accept the responsibility for unauthorized shipments.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

SECTION 5.
ALIGNMENT

This receiver has been carefully aligned at the factory by specially trained personnel using precision equipment. Alignment of the receiver should not be attempted until all other possible causes of faulty operation have been investigated. Alignment should not be required unless the receiver has been tampered with or unless component parts have been replaced in the r-f or i-f stages. Alignment should be made only by persons familiar with communications receivers and experienced in their alignment. Refer to Figs. 10 and 11 for the location of all alignment adjustments.

5-1. EQUIPMENT REQUIRED

1. Vacuum tube voltmeter (VTVM)) or other high impedance DC volmeter.
2. Signal generator covering 50 KC to 30 MC.
3. Non-metallic alignment tool for IF alignment with dimensions shown in Fig. 7.
4. Alignment tools for RF alignment.
5. Output meter (or AC scale of VTVM or other suitable meter). Connect the output meter to the appropriate speaker terminals. The receiver output should be properly terminated with a dummy load if a VTVM is used.

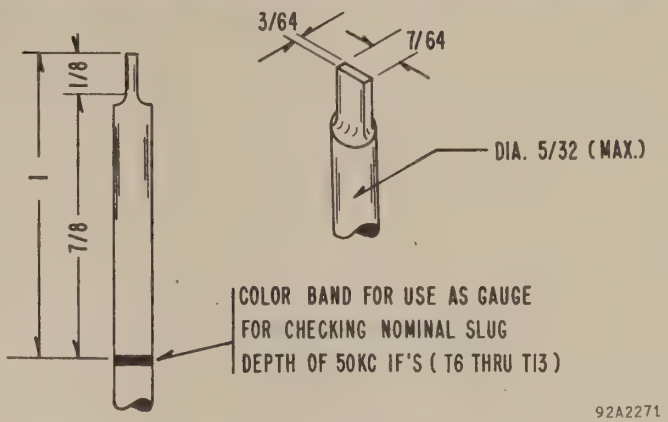


Fig. 7. IF Alignment Tool

5-2. INITIAL CONTROL SETTINGS

Band Selector	As indicated in chart.
Sensitivity and Volume	10 (maximum)
Band Width	As indicated in chart.
CW-AM-SSB	AM
ANL, AVC, and Cal.	Off
Rec-Standby	Rec
Response	Normal
Main Tuning and Band Spread Tuning Dials	At high frequency end

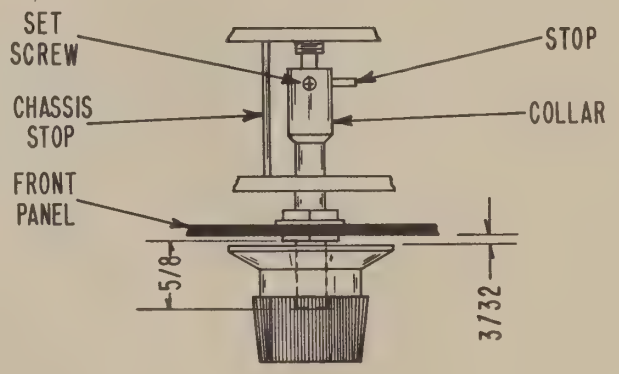


Fig. 8. Pitch Control

5-3. ALIGNMENT PROCEDURE

Step	Dummy Antenna	Signal Generator Connections	Signal Generator Frequency	Band Selector Setting	Output Connections	Band Width Setting	Remarks
			50 KC IF ALIGNMENT				
1	Direct	Disconnect wire lead from terminal 4 of T3 (Fig. 11). Connect high side of generator to lead and low side to chassis.	50 KC (unmod)	1	VTVM DC probe to test point "A" (detector load resistor). See Fig. 11. Common to chassis.	.25 KC	Adjust T6, T7, T8, T9, T10, T11, T12, and T13 (50 KC IFs) for maximum indication, maintaining approx. 1 volt reading on VTVM. It is possible to obtain resonance at two different positions of the tuning slug. In the correct position, the top of the slug is approx. 7/8" from top of coil retaining clip. See Fig. 7.
			BFO ADJUSTMENT				
2	"	"	"	"	" (Use 100-volt or higher range for Step 2.)	"	Set CW-AM-SSB switch at "CW". Using speaker as indicator, adjust Pitch control for "zero beat". If knob reads zero and has equal rotation either side of zero, no further adjustment is required. If not, remove knob and loosen set screw and stop on collar. (See Fig. 8.) Adjust L31 (BFO coil) for "zero beat" thru hollow collar. Then position collar so that stop on collar is diametrically opposite chassis stop and so that Pitch control shaft protrudes approx. 5/8" from panel bushing as shown in Fig. 8. Tighten set screw and stop and position knob on shaft so that knob reads zero and so that rear of knob is approx. 3/32" from front panel. When properly positioned, tighten knob set screws. Next set CW-AM-SSB switch at "SSB" and adjust L32 (BFO amp coil) for maximum indication on VTVM. Switching from "SSB" to "CW" should produce approx. an 8 to 1 voltage change (decreasing). After completing Step 2, return CW-AM-SSB switch to "AM".

Step	Dummy Antenna	Signal Generator Connections	Signal Generator Frequency	Band Selector Setting	Output Connections	Band Width Setting	Remarks
AVC AMP. ADJUSTMENT							
3	"	"	"	"	VTVM DC probe to test point "B" (AVC bus). See Fig. 11. Common to chassis.	10 KC	Tune generator slowly thru 50 KC to determine IF passband. Then set generator frequency to center of passband. Next set AVC switch at "ON" and increase generator output to overcome delay bias on AVC amp tube. Adjust L28 (AVC amp coil) for maximum AVC voltage as indicated on VTVM. Maintain approx. 1 volt reading on VTVM. After completing Step 3, reconnect lead to terminal 4 on T3 and return AVC switch to "OFF".
2075 KC IF ALIGNMENT							
4	"	Remove gang housing cover and connect high side of generator to test point "C" (stator of section C1F of main tuning gang). See Fig. 10. Low side to frame of gang.	2075 KC (mod)	"	Output meter across appropriate speaker terminals. (VTVM to test point "A" if it desired to monitor detector voltage.)	"	Tune generator slowly thru 2075 KC to determine IF passband. Then set generator to center of passband, using sufficient generator output to obtain approx. 1/2 watt receiver output. If no output is obtained, the 2125 KC crystal oscillator may not be oscillating and it will be necessary to turn up the generator output and adjust the 2125 KC crystal activity adjustment (bottom slug of T5) until output is obtained. Adjust for maximum output by adjusting the signal generator frequency, crystal activity (bottom slug of T5) and the 2075 KC IFs (top and bottom slugs of T1 and T3). Note that the signal suddenly disappears when the crystal activity slug is turned into the coil and gradually drops in level when the slug is backed out of the coil. Set the crystal activity adjustment (bottom slug of T5) for half output on the gentle slope side of maximum response. Then set the generator as near the center of the IF passband as possible and adjust the top and bottom slugs of T1 and T3 for maximum output. Tune through the passband and observe the shape of the response. If it is symmetrical the adjustment is completed; if not, reset the generator frequency near the center of the passband and repeak T1 and T3.
1550 KC IF ALIGNMENT							
5	"	"	1550 MC (mod)	2	"	"	Adjust the signal generator frequency, the 1500 KC crystal activity adjustment (top slug of T5), and the 1550 KC IFs (top and bottom slugs of T2 and T4) using the same general procedure outlined in Step 4 for the 2075 KC IF.
IF SENSITIVITY CHECK							
6	With the generator connected as in Step 4 and modulated 30% at 400 cycles, the IF input required for 1/2 watt receiver output should be 100 microvolts or less at 2075 KC (Band 1) and 50 microvolts or less at 1550 KC (Band 2). This assumes the crystal activity is set for half of maximum response as outlined in Steps 4 and 5 above.						

RF ALIGNMENT

Before proceeding with the RF alignment:

A. Rotate the MAIN TUNING and BAND SPREAD TUNING controls fully clockwise and align the dial pointers with the index marks at the low frequency end of the dial by means of the small knob directly below each dial.

B. Then rotate the BAND SPREAD TUNING control counterclockwise until the dial pointer is aligned with the index marks at the high frequency end of the dial. Lock the band spread dial in position to avoid disturbing its setting.

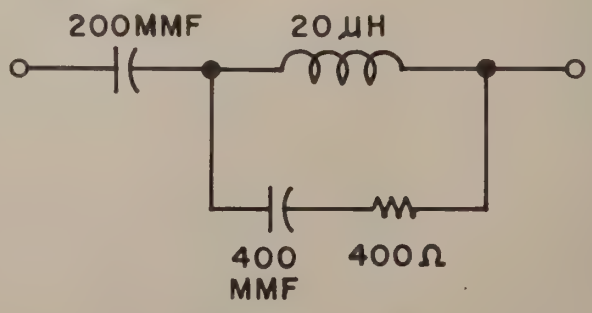
RF alignment must be made with the bottom shield cover in place.

Use a modulated signal.

Connect the output meter across the appropriate speaker terminals. (Connect the VTVM to test point "A" if it is desired to monitor the detector voltage.) Maintain a 1/2 watt receiver output.

Set the SENSITIVITY and VOLUME at "10" (maximum), BAND WIDTH at "5 KC"; AVC, ANL, and CAL at "OFF", CW-AM-SSB at "AM", REC-STANDBY at "REC", and RESPONSE AT "NORMAL".

The oscillator frequency is higher than the signal frequency on all bands.



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Fig. 9. RTMA Dummy Antenna

RF ALIGNMENT (Cont.)					
Step	Dummy Antenna	Signal Generator Connections	Generator & Receiver Frequency	Band Selector Setting	Adjust for Maximum
7	RTMA Dummy (Fig. 9)	High side to antenna terminal A1. Low side to A2. Jumper between A2 and G.	1.50 MC	1	C114 (osc. trimmer), C29 (mixer trimmer), and ANTENNA TRIMMER control on front panel.
	"	"	.56 MC	"	L24 (osc. slug) and L18 (mixer slug)
8	47-ohm carbon resistor	"	2.8 MC	2	C111 (osc. trimmer), C28 (mixer trimmer), C16 (RF trimmer), and ANTENNA TRIMMER control.
	"	"	1.8 MC	"	L23 (osc. slug) L17 (mixer slug), L11 (RF slug), and L5 (antenna slug)
9	"	"	1.55 MC	"	Set main tuning gang fully closed. Set generator frequency for maximum IF response, using sufficient generator output to obtain 1/2 watt receiver output. Then adjust L6 (1550 KC trap) for maximum rejection (minimum output indication).
10	"	"	5.1 MC	3	C107 (osc. trimmer), C27 (mixer trimmer), C15 (RF trimmer), and ANTENNA TRIMMER control.
	"	"	3.2 MC	"	L22 (osc. slug), L16 (mixer slug), and L10 (RF slug)
11	"	"	9.0 MC	4	C102 (osc. trimmer), C26 (mixer trimmer), C14 (RF trimmer), and ANTENNA TRIMMER control.
	"	"	5.6 MC	"	L21 (osc. slug), L15 (mixer slug), and L9 (RF slug)
12	"	"	16.5 MC	5	C99 (osc. trimmer), C25 (mixer trimmer), C12 (RF trimmer), and ANTENNA TRIMMER control.
	"	"	10.3 MC	"	L20 (osc. slug), L14 (mixer slug), and L8 (RF slug)
13	"	"	30.0 MC	6	C93 (osc. trimmer), C23 (mixer trimmer), C11 (RF trimmer), and ANTENNA TRIMMER control.
	"	"	18.7 MC	"	L19 (osc. slug), L13 (mixer slug), and L7 (RF slug)

SENSITIVITY ADJUSTMENT

14 Set the AVC switch at "ON", BAND SELECTOR at Band 3, and the main tuning dial to 3.2 MC. Short the antenna terminals and adjust the "S" METER ADJ control at the rear of the receiver until the meter pointer is in line with the left-hand index marks on the meter. (NOTE: With the receiver turned off, the "S" meter pointer should be in line with the right-hand index marks on the meter. If not, remove the "h" insignia directly below the meter and turn the adjustment screw as required.) Set the signal generator to 3.2 MC, adjust the generator for 50 microvolt output, and then adjust the bottom slug of T5 for 50 microvolts on the "S" meter. CAUTION: The bottom slug of T5 should be set so that the crystal oscillator is operating on the gentle slope portion of its tuning characteristic.

Switch the BAND SELECTOR to Band 2, set the generator and main tuning dial at 1.8 MC, adjust the generator for a 50 microvolt output, and then adjust the top slug of T5 for 50 microvolts on the "S" meter, again operating on the gentle slope portion of the oscillator tuning characteristic.

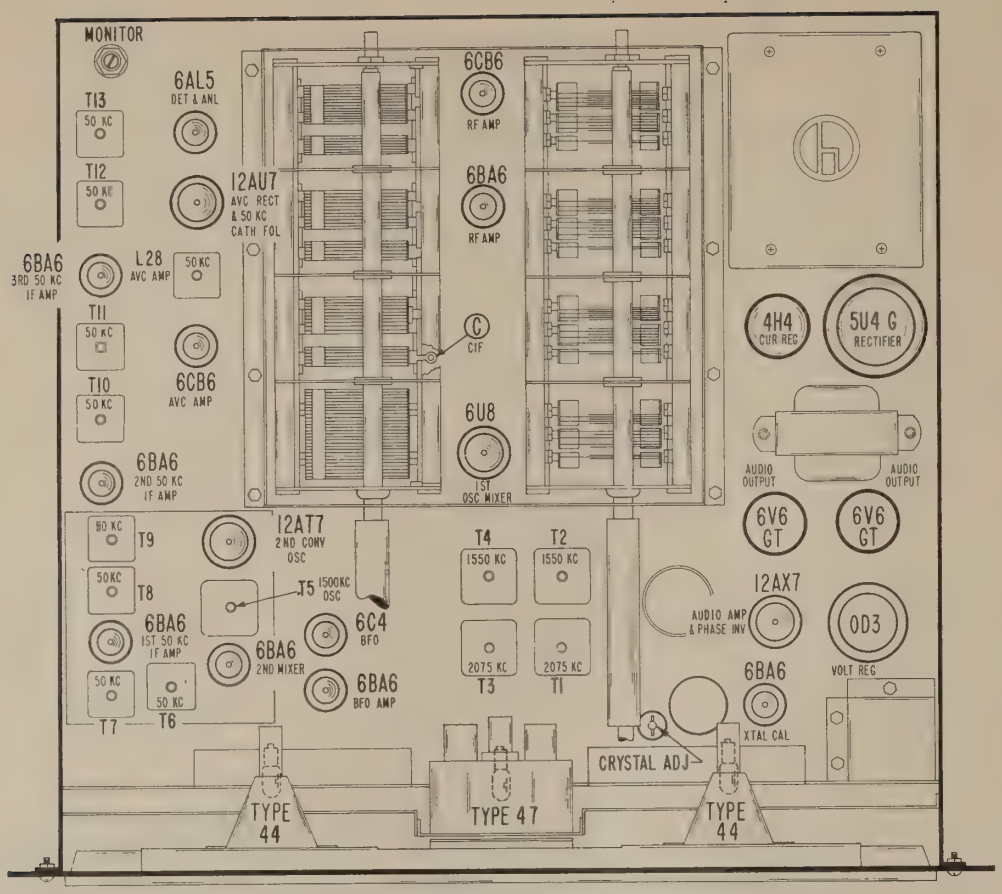


Fig. 10. Top View of Chassis Showing Location of Alignment Adjustments, Tubes, and Dial Lamps

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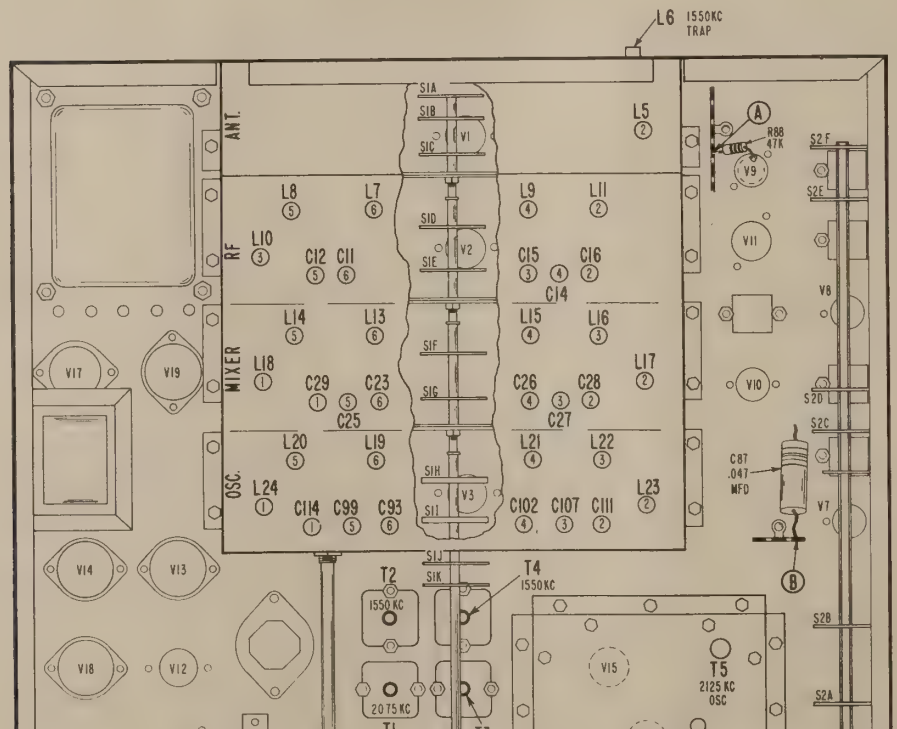


Fig. 11. Bottom View of Chassis Showing Location of Alignment Adjustments and Tubes

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SECTION 6.

PERFORMANCE DATA FOR SERVICE ENGINEERS

MEASUREMENT CONDITIONS

1. POWER SOURCE: 117 volts, 60 cycles AC
2. STANDARD AUDIO OUTPUT: .5 watt into 500 ohms
3. MODULATION: 30% at 400 cycles
4. DUMMY ANTENNA:
   Band 1: RTMA Dummy
   Bands 2-6: 47 ohms
5. Oscillator frequency higher than signal frequency on all bands.
6. CONTROL SETTINGS:
   Sensitivity - 10 (max)
   Volume - 10 (max)
   ANL, AVC, and CAL - Off
   CW-AM-SSB - AM
   Band Width - 5 KC
   Band Selector - Band 1
   Response - Normal
   Main Tuning Dial - gang half open
   Band Spread Dial - index marks at high end

** IF REJECTION

BAND	MIN DB	BAND	MIN DB
1	50	4	80
2	80	5	80
3	80	6	80

** Band Spread gang fully open

* IF BANDWIDTH (2075 KC)

BAND WIDTH CONTROL SETTING	6 DB (X2)	60 DB (X1000)
.25 KC	.15 - .25 KC	1.0 KC (Max)
.5 KC	.38 - .57 KC	1.8 KC "
1.25 KC	1.0 - 1.5 KC	3.8 KC "
2.5 KC	2.0 - 3.0 KC	7.9 KC "
5 KC	4.0 - 6.0 KC	15.0 KC "
10 KC	8.0 - 12.0 KC	24.0 KC "

* IF performance thru 1550 KC channel (Band 2) is essentially the same as 2075 KC channel.

AUDIO PERFORMANCE

POWER OUTPUT: 10 watts (max)
FREQUENCY RESPONSE: ± 2 db from 20 to 20,000 cycles thru Phono input with Response at Hi Fid (500 ohm output)
HARMONIC DISTORTION: Less than 10% at 10 watt output with 400 cycles at Phono input.
HUM: Less than 15 uw with Volume at min. and Response at Hi Fid.
BASS BOOST: Not less than 8 db at 70 cycles.

BAND	FREQ. (MC)	RF SENSITIVITY		IMAGE RATIO (MIN DB)
		MAX. UV FOR .5 WATT OUTPUT	MAX. UV FOR 10 DB SIG/NOISE	
1	.56	8.0	12.0	100
	1.0	6.0	12.0	80
	1.5	5.0	12.0	80
2	1.8	1.0	2.0	100
	2.3	1.0	1.5	100
	2.8	1.0	1.5	90
3	3.2	1.0	1.5	100
	4.1	1.0	1.5	90
	5.1	1.0	1.5	80
4	5.6	1.0	1.5	90
	7.3	1.0	1.5	80
	9.0	1.0	1.5	80
5	10.3	1.0	1.5	90
	13.4	1.0	1.5	80
	16.5	1.0	1.5	70
6	18.7	1.5	2.0	70
	24.0	1.5	2.0	60
	30.0	1.5	2.0	58

SECTION 7.
SERVICE DATA

7-1. TECHNICAL SPECIFICATIONS

TUBES: 20 tubes including current regulator, voltage regulator, and rectifier.
SPEAKER OUTPUT; 3.2, 8, and 500 ohms
HEADPHONE OUTPUT: High impedance
ANTENNA INPUT: For single wire or 52-600 ohm balanced or unbalanced line.
PHONO INPUT: High impedance
*POWER SOURCE:
Model SX-88 . . . 105-125 volts, 50-60 cycles
Model SX-88U. . . 100-250 volts, 25-60 cycles.
POWER CONSUMPTION: 138 watts
RECEPTION: AM, CW, and SSB
AUDIO OUTPUT: 10 watts (maximum)
INTERMEDIATE FREQUENCIES (Double Conversion):
Band 1, 3-6 . . . . . 50 KC & 2075 KC
Band 2 . . . . . 50 KC & 1550 KC

FREQUENCY COVERAGE

Band	Frequency Range	Calibrated Band Spread
1	.535 - 1.7 MC	-
2	1.69 - 3.0 MC	160M
3	2.98 - 5.5 MC	80M
4	5.4 - 10.0 MC	40M
5	9.8 - 18.3 MC	20M
6	17.8 - 33.0 MC	15M, 11-10M

* Provisions are also included for operation from an external DC power source.

7-2. CHASSIS REMOVAL

To remove the chassis from the cabinet, remove two screws at each side of the front panel and four screws at the bottom of the cabinet.

7-3. TUBE and DIAL LAMP REPLACEMENT

To gain access to the tubes and dial lamps, raise the hinged top cover of the cabinet. The tube locations, as well as their functions, are shown in Fig. 10.

7-4. 50 KC IF SYSTEM

Fig. 12 shows the type of coupling used in the 50 kc IF stages. Note that inductive coupling is avoided by careful shielding of the IF coils and signal transfer occurs only through capacitance and resistance. By increasing the value of "C" and "R", the selectivity is made more broad while by decreasing their values, the selectivity is made more sharp. The proper values of "C" and "R" are switched in the circuit by means of the BAND WIDTH control. "R" varies the "Q" of the circuit and "C" varies the coupling. This R-C coupling arrangement affords a more accurate means of selectivity control than that readily obtainable by any other method.

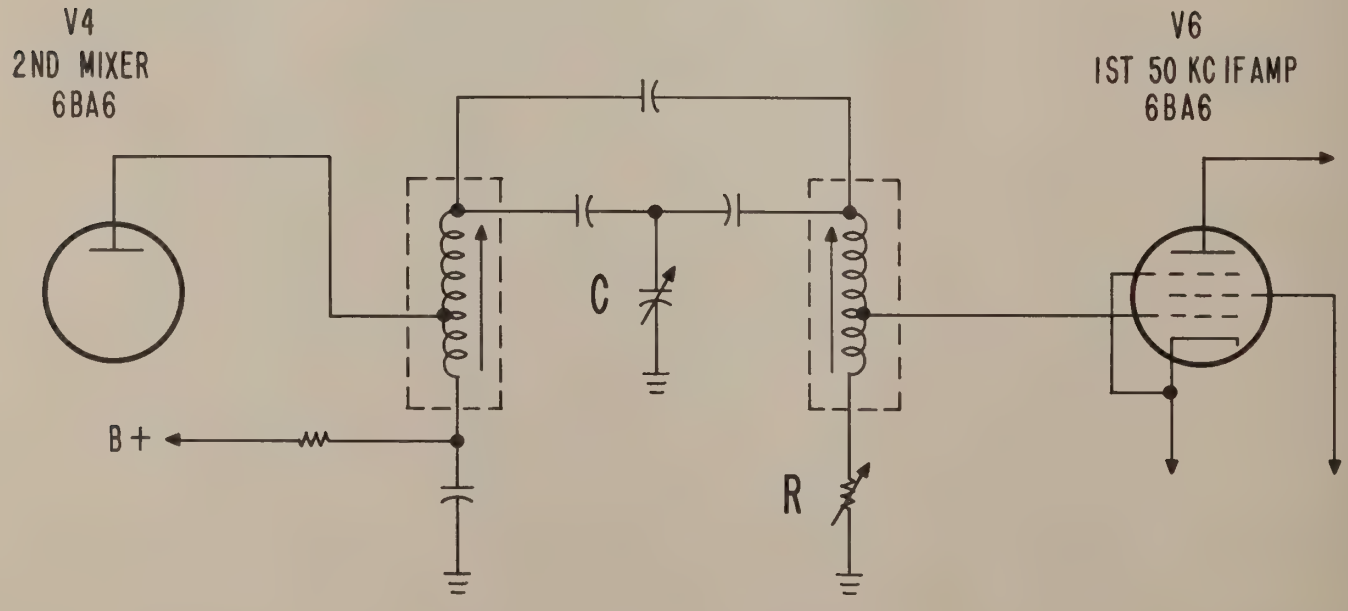


Fig. 12. Portion of 50 KC IF System

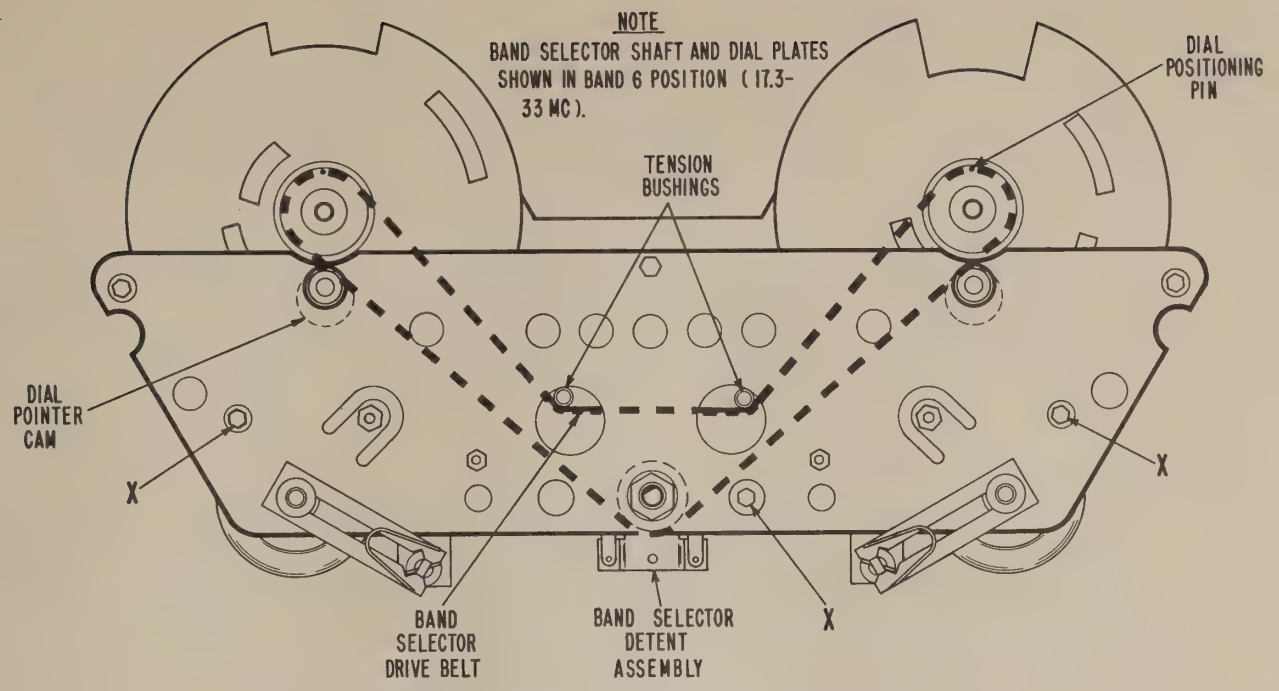


Fig. 13. Front View of Gear Drive Mechanism

7-5. BAND SELECTOR DRIVE BELT REPLACEMENT (Refer to Fig. 13)

1. Set Band Selector control to Band 6 (17.8 - 33 mc).
2. Remove chassis from cabinet by removing four screws at bottom of cabinet and two screws at each side of front panel.
3. Remove all front control knobs and PHONES jack mounting nut.
4. Remove front panel from chassis by removing three screws at each side of front panel.
5. Remove dial lamp brackets by removing two self-tapping hex head screws at rear and binding head screw and nut at side.
6. Remove "S" meter by removing two Phillips head screws directly below meter (at the front).
7. Remove toggle switch mounting nuts and then remove switches from gear mechanism.
8. Loosen flexible coupling on Band Selector shaft and slide toward rear on shaft.
9. Loosen couplings on main tuning and band spread gangs and slide toward rear on shaft.
10. Remove gear mechanism from chassis by removing three self-tapping hex head screws marked "X" in Fig. 13.
11. Remove dial pointers by removing retaining clip at front of pointer.
12. Remove large hex nut from front of both dials and then remove dials.

    CAUTION: To prevent scratching the dials, position the dial pointer cams downward as shown in Fig. 13 and bend the dials sufficiently when removing to provide clearance between the dial and dial pointer cams.

13. Loosen hex nut on one of the two drive belt tension bushings at rear of mechanism and then slip drive belt up over bushings.
14. Remove Band Selector detent assembly from gear mechanism by removing hex nut at front.
15. Remove drive belt by slipping up over dial plate and rotating dial plate as required to provide clearance for removal.
16. To replace drive belt, reverse sequence used above for removing belt. When replacing belt, position both dial plates so that cutout at outer edge of dial plate is vertical as shown in Fig. 13. This is correct position of dial plates when the Band Selector is set at Band 6.
17. Before tightening the main tuning and band spread couplings in place, fully mesh the main tuning and band spread gangs and rotate the MAIN TUNING and BAND SPREAD TUNING controls fully clockwise.

7-6. "S" METER ADJUSTMENTS

The "S" meter has two adjustments, one mechanical and the other electrical. The mechanical adjustment, accessible by removal of the "h" insignia directly below the meter, has been accurately set at the factory and will normally not require any further adjustment. Adjustment can be made, if required, by turning off the receiver and carefully rotating the adjustment screw until the meter pointer is in line with the right-hand index mark.

The electrical adjustment of the "S" meter is made by carefully turning the "S" METER ADJ control at the rear of the receiver, until the meter pointer is in line with the left-hand index mark. The electrical adjustment should be made with the receiver on, antenna terminals shorted, SENSITIVITY at "10", CW-AM-SSB switch at "AM", AVC switch at "ON", CAL OFF-ON switch at "OFF", REC-STANDBY switch at "REC", and BAND SELECTOR at Band 3. The settings of the remaining controls do not affect the "S" meter reading.

7-7. ADJUSTMENT OF CRYSTAL ADJ CONTROL

The CRYSTAL ADJ control on the top front of the chassis operates a trimmer capacitor connected across the 100 kc calibrating crystal. This trimmer capacitor permits adjustment of the calibrating crystal to exactly 100 kc by comparison with the frequencies transmitted by station WWV. This capacitor has been set at the factory and should normally not require periodic readjustment unless extreme calibration accuracy is desired. If adjustment is required, proceed as outlined below.

Set the CW-AM-SSB switch at "AM", the CAL OFF-ON switch at "OFF", and all other front panel controls as for normal AM reception. Tune in station WWV on any one of its operating frequencies (2.5, 5, 10, 15, 20, or 25 mc) and wait for the period during which the signal from WWV is unmodulated. Then switch on the crystal calibrator by setting the CAL OFF-ON switch at "ON" and adjust its frequency, by means of the CRYSTAL ADJ control, until the crystal calibrator signal "zero beats" with the signal received from WWV. If adjustment is attempted during periods that WWV is modulated, zero beat may be obtained with the modulating frequency rather than the desired carrier frequency.

7-8. CONTROL KNOB POSITIONING

SENSITIVITY. . . . . "0" at full counterclockwise rotation

BAND WIDTH . . . . . "10 KC" at full counterclockwise rotation

MAIN TUNING. . . . . "0" at full clockwise rotation

BAND SELECTOR . . . . . As required by flat on shaft

ANTENNA TRIMMER . . . . . "5" to right of "0" with antenna trimmer variable capacitor fully meshed.

BAND SPREAD TUNING . . . "0" at full clockwise rotation

RESPONSE . . . . . "BASS BOOST" at full counterclockwise rotation

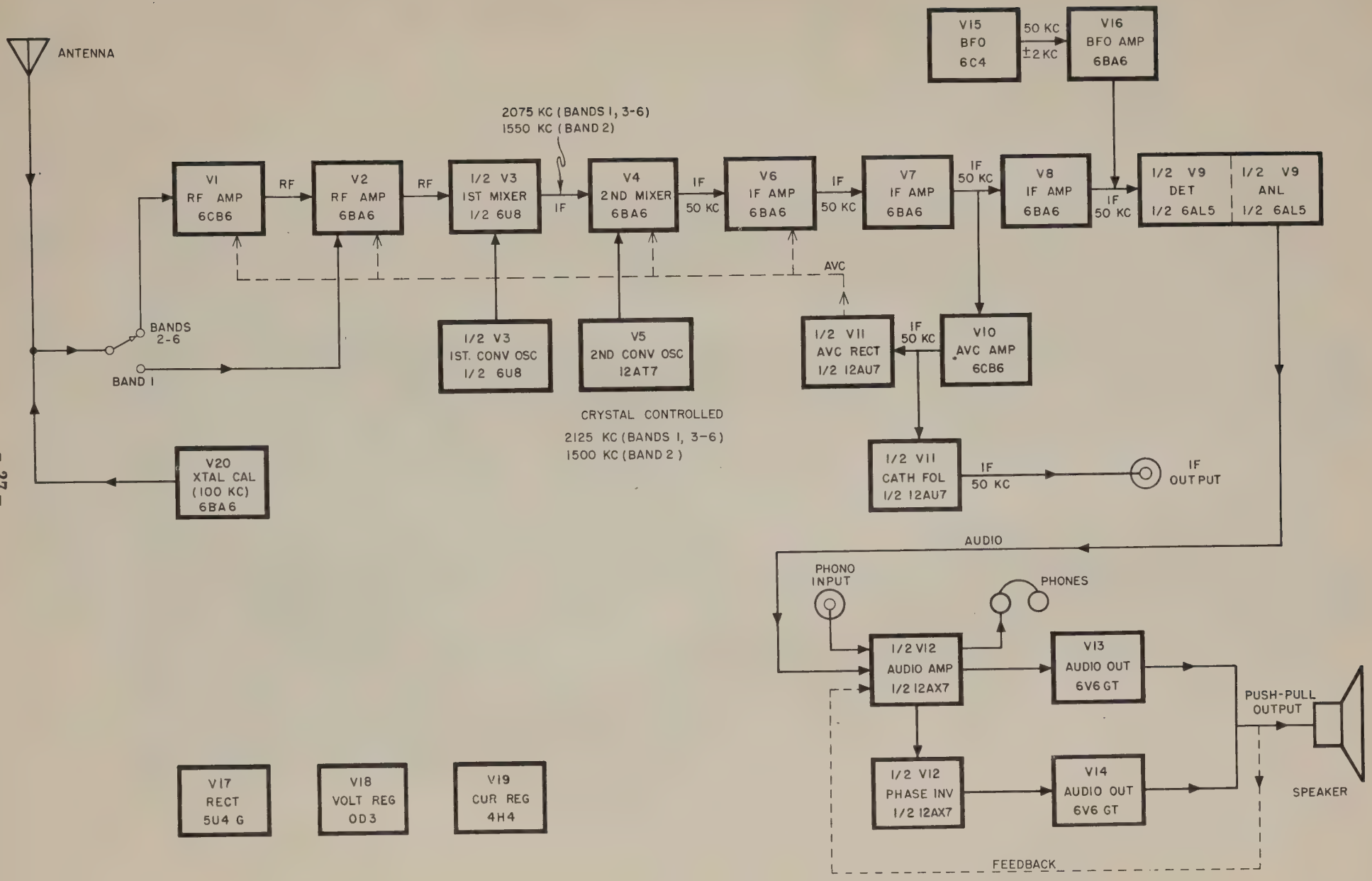
VOLUME . . . . . Align "0" with index line at full counterclockwise rotation

LOCK . . . . . As shown in Fig. 4 at full clockwise rotation

PITCH . . . . . Tune in a steady, unmodulated carrier with the CW-AM-SSB switch at "AM", AVC switch at "ON", and the BAND WIDTH control at ".25 KC". (If desired, the built-in crystal calibrator may be used as the carrier source.) Then set the CW-AM-SSB switch at "CW", adjust the PITCH control for "zero beat", and set the knob at "0" with approx. 3/32" clearance between the front panel and rear of knob.

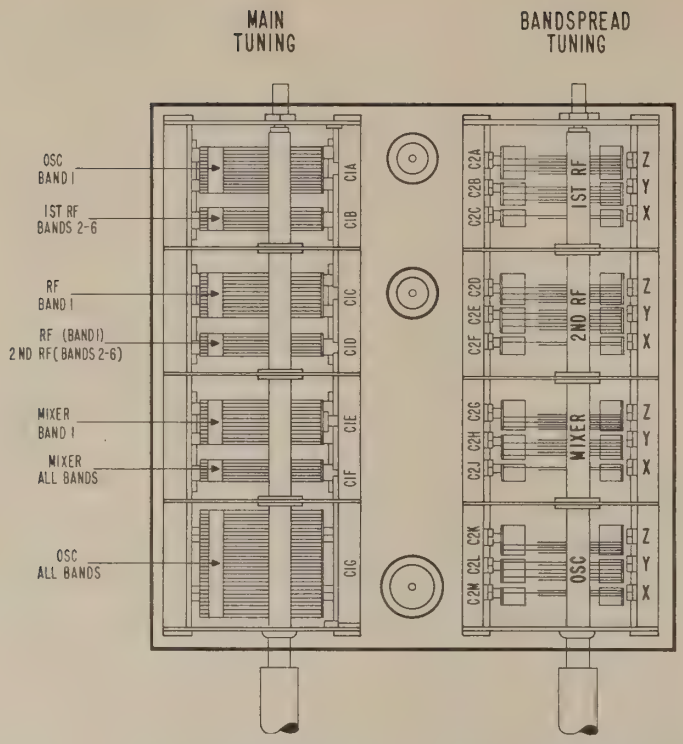
7-9. SERVICING OF GEAR DRIVE TUNING MECHANISM

The gear drive tuning mechanism in your receiver is precision built to Hallicrafters most exacting standards. If not tampered with, this mechanism will provide long, trouble-free performance. No attempt should be made to service this mechanism in the field other than to replace the band selector drive belt (Section 7-5). If service is required, consult the Hallicrafters dealer, distributor, or Authorized Service Center in your locality. Make no service shipments to the factory as the Hallicrafters Company will not accept the responsibility for unauthorized shipments. Removal of the mechanism from the receiver can be accomplished by following Steps 1 through 10 of Section 7-5. After reassembling the mechanism in the receiver, synchronize the tuning mechanism with the gangs as outlined in Step 17 of Section 7-5.



92D2227

Fig. 14. Block Diagram of Receiver



BAND	GANG SECTION (S) USED
1	NONE
2	Z
3	Z
4	Y
5	X
6	X+Y

NOTES

1. Where more than one section is indicated on the main tuning gang for a particular band, these sections are connected in parallel. For example: on Band 1, the oscillator stage is tuned by means of C1A & C1G in parallel.
2. The sections of the main tuning and band spread tuning gangs in use are connected in parallel.

Fig. 15. Location and Function of Tuning Gang Sections

92C2253

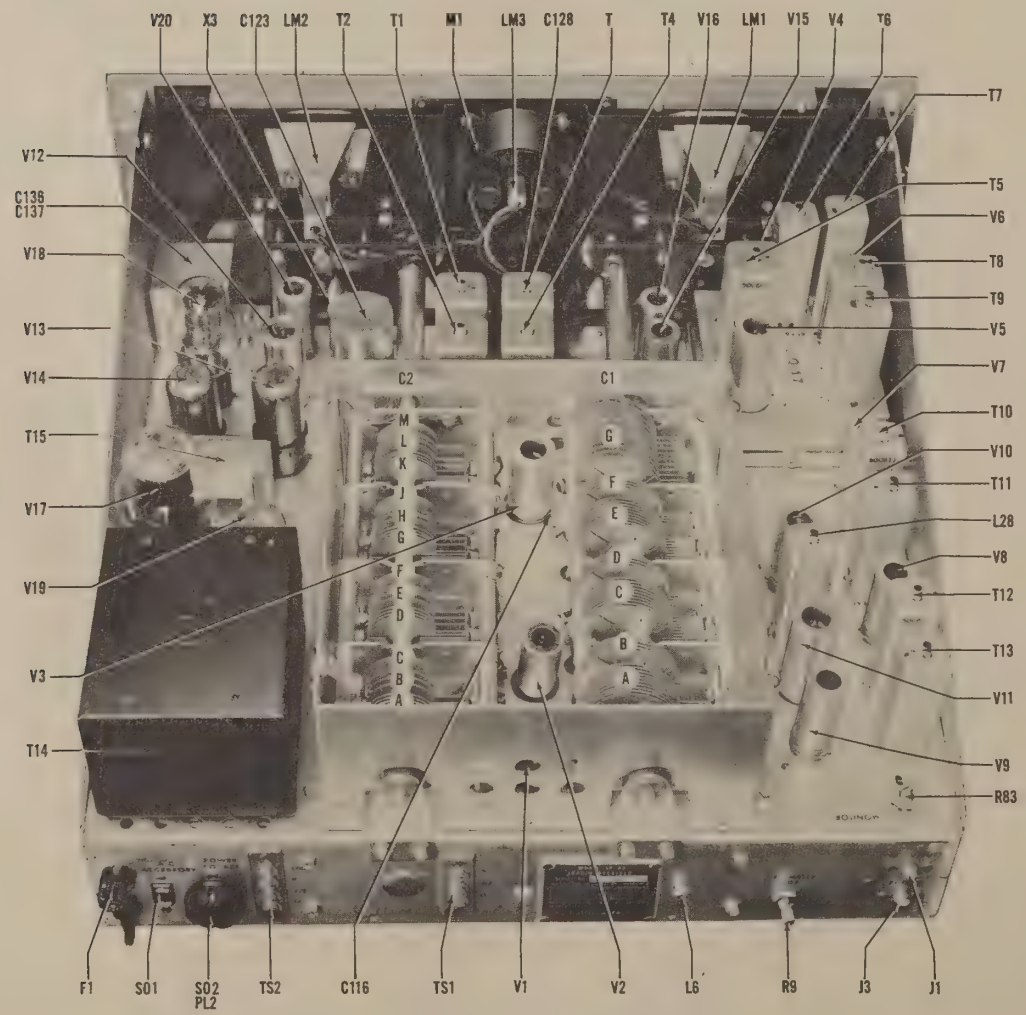
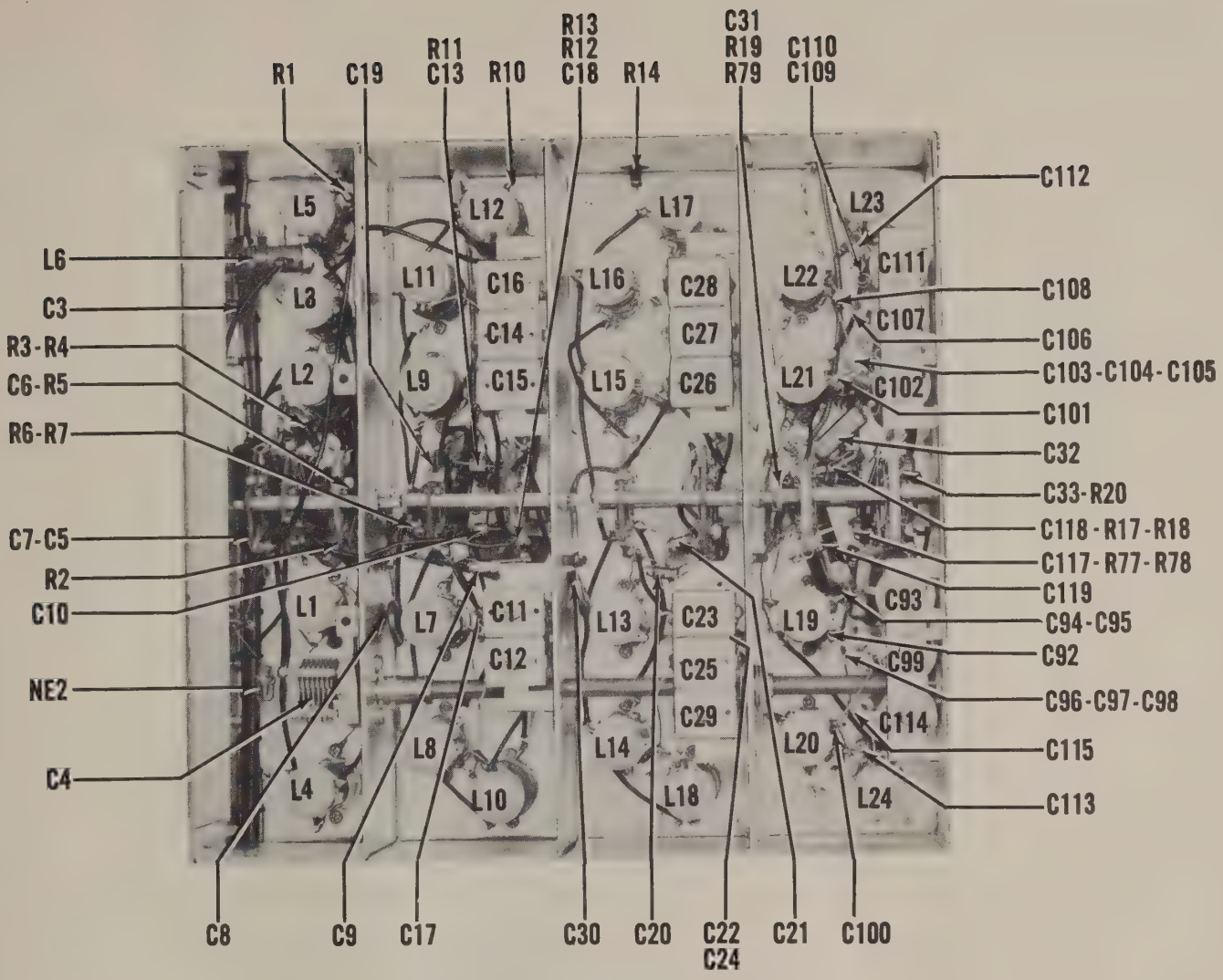


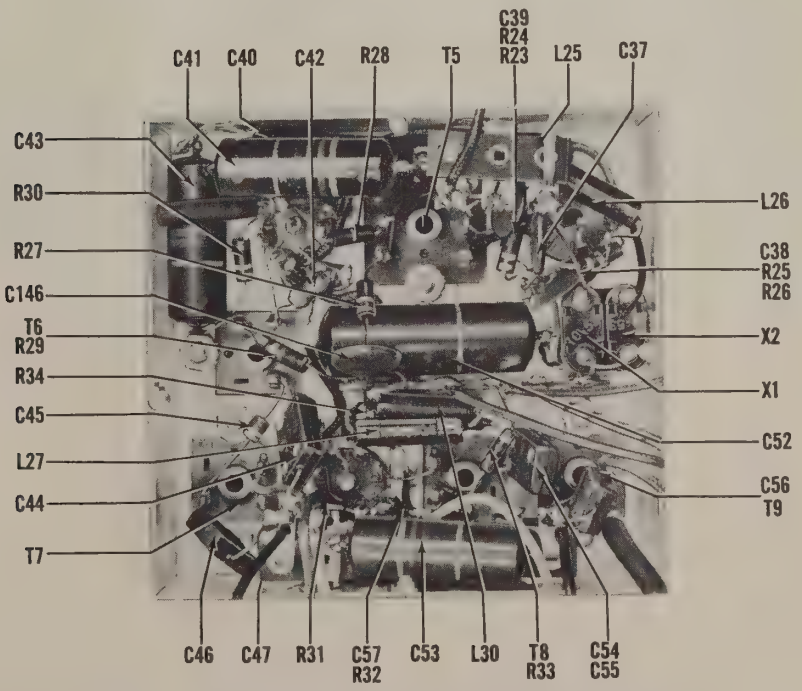
Fig. 16. Top View of Chassis Showing Component Location

92X2246



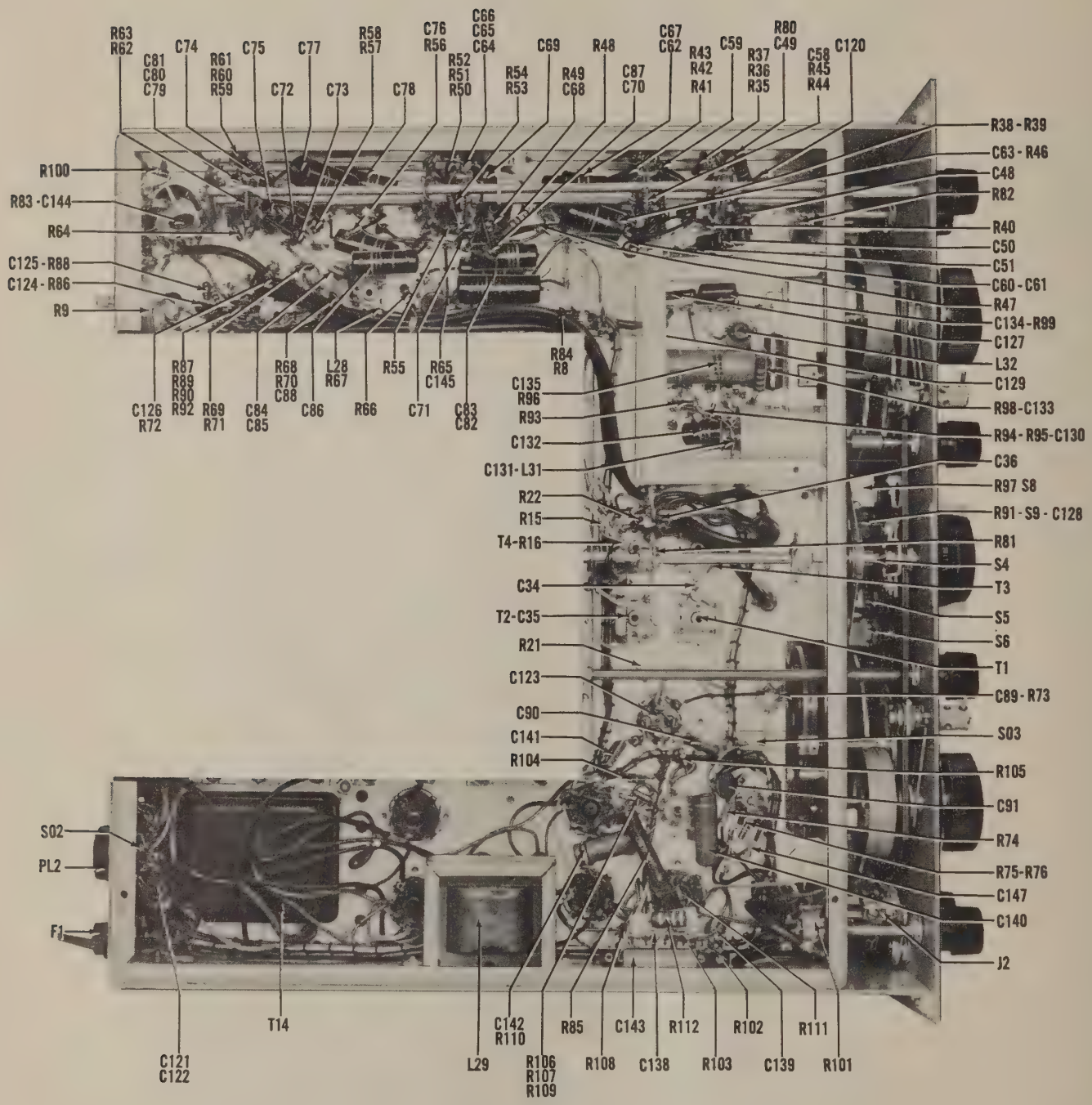
92X2248

Fig. 17. Bottom View of RF Deck Showing Component Location



92X2249

Fig. 18. Bottom View of 2nd Converter Sub-Chassis Showing Component Location



92X2247

Fig. 19. Bottom View of Chassis Component Location

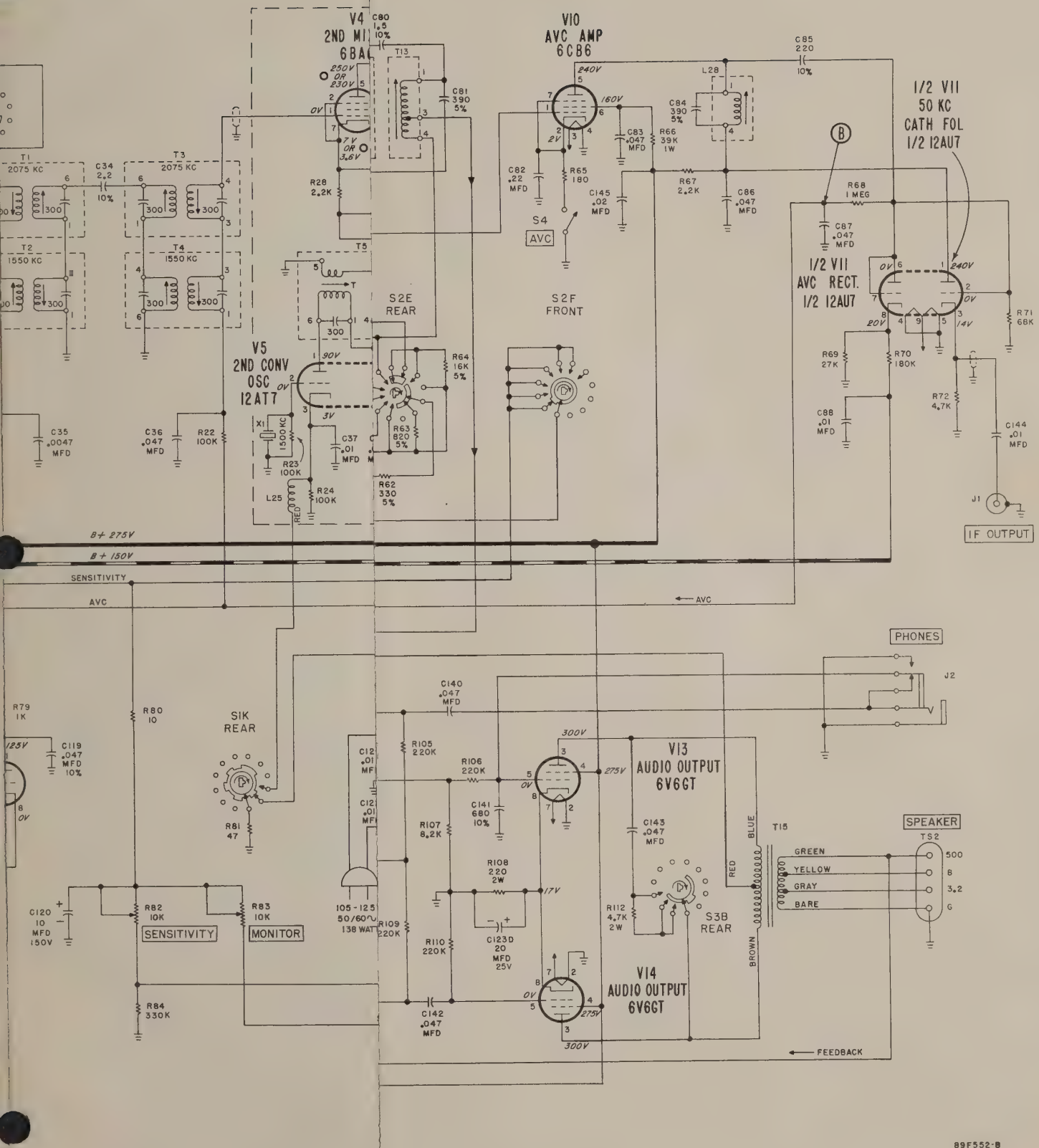
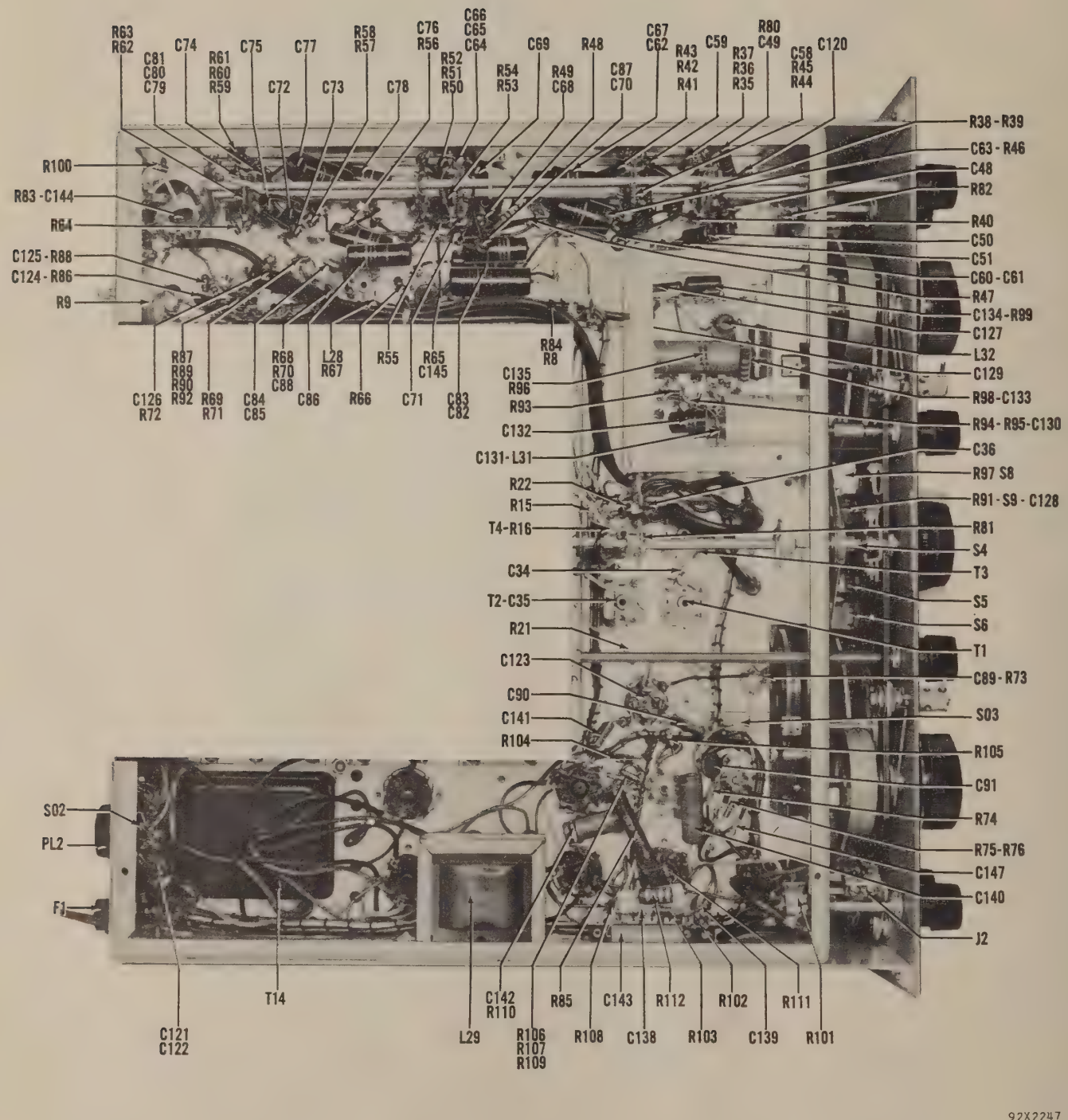


Fig. 20. Schematic Diagram



92X2247

Fig. 19. Bottom View of Chassis Component Location

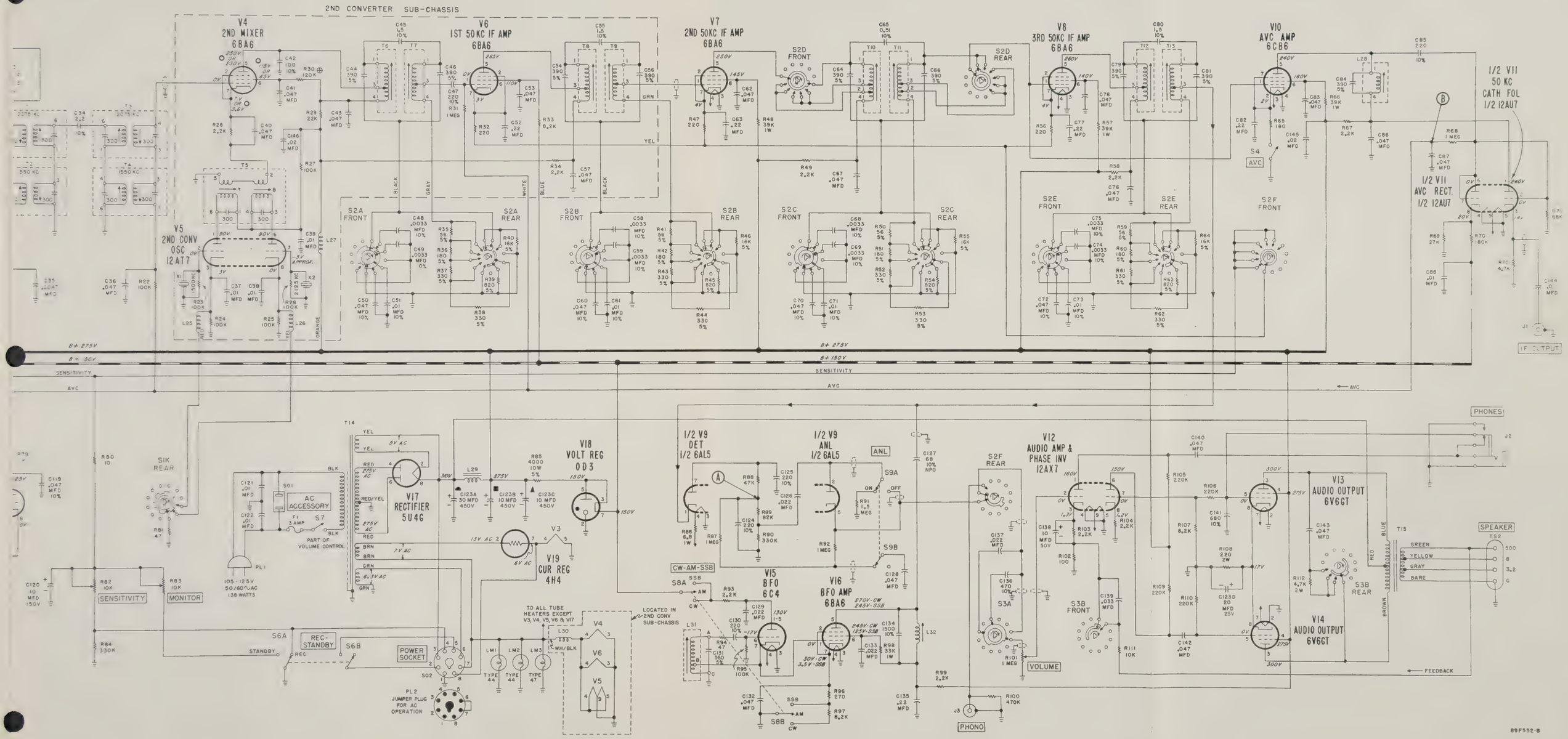


Fig. 20. Schematic Diagram

SERVICE PARTS LISTS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
	TUBES AND DIAL LAMPS	
V-1,10	6CB6: 1st RF Amp, AVC Amp	90X6CB6
V-2,4,6,7,8 16,20	6BA6: 2nd RF Amp, 2nd Mixer, 1st 50 KC IF Amp, 2nd 50 KC IF Amp, 3rd 50 KC IF Amp, BFO Amp, Xtal Cal.	90X6BA6
V-3	6U8: 1st Oscillator-Mixer	90X6U8
V-5	12AT7: 2nd conv. oscillator	90X12AT7
V-9	6AL5: Detector and ANL	90X6AL5
V-11	12AU7: AVC Rect. and 50 KC Cath. Fol.	90X12AU7
V-12	12AX7: Audio Amp and Phase Inv.	90X12AX7
V-13,14	6V6GT: Audio Output	90X6V6GT
V-15	6C4: BFO	90X6C4
V-17	5U4G: Rectifier	90X5U4G
V-18	OD3: Voltage Regulator	90X0D3
V-19	4H4: Current Regulator	90X4H4
LM-1,2	Lamp, pilot; type 44	39A003
LM-3	Lamp, pilot; type 47	39A004
	MISCELLANEOUS	
	Belt, drive; Band Selector	14B374
	Cabinet, complete	41X25313
	Clip, gang shield; top section	76B148
	Clip, gang shield; bottom section	76B149
	Coupling flexible (for Band Selector shaft)	
	3-5/8" overall	29B222
	3-1/8" overall	29B224
X-1	Crystal, 1500 KC	19B1890
X-2	Crystal, 2125 KC	19B1891
X-3	Crystal, 100 KC	19B1886
	Detent, Band Selector switch	62C073
	Dial, band spread tuning	83D466
	Dial, main tuning	83D470
	Dial pointer assembly	41C25327
	Escutcheon, front panel	7D466
	Foot, mtg.; rubber	16A029
F-1	Fuse, 3 amp 250V; type 3AG	39A301
	Gear drive assembly, complete	41X25311
	Glass, band spread tuning dial	22B413
	Glass, main tuning dial	22B412

Schematic Symbol	Description	Hallicrafters Part Number
	MISCELLANEOUS (Cont.)	
	Grommet, rubber; "S" meter	16B362
	Grommet, rubber; tuning gang rear support	16A180
	Holder, fuse	6A451
	Insignia, "h"	7B485
	Knob assembly, MAIN TUNING and BAND SPREAD TUNING	41B25314
	Calibrated plate (0-100)	83B454
	Knob, phenolic	15B693
	Spring	75B294
	Button plug	17B138
	Hub	77B717
	Knob, ANTENNA TRIMMER	15A061
	Knob, BAND SELECTOR	15C743
	Knob, BAND WIDTH	15B679
	Knob, LOCK	15B699
	Knob, PITCH	15B677
	Knob, pointer set	15B676
	Knob, RESPONSE	15B678
	Knob, SENSITIVITY and VOLUME	15A097
NE-2	Lamp, neon glow; GE type NE2; 1/25 W., 65V AC starting	39A012
PL-1	Line cord and plug	87A3644
	Logging scale, tuning dial	83C475
	Lock, line cord	76A397
M-1	Meter, "S"; 0-5 ma	82C248
	Panel, front	68D241
	Retainer, tube; V-17	76A1032
	Shaft, extension; Antenna Trimmer	74B635
	Shaft, Band Selector	
	10-3/4" long	74B636
	11-1/4" long	74B702
	Snap-in tri-mount	5A006
	Terminal board, steatite; 3 post type lugs (used as tie strip for oscillator padders)	41X25346
	Terminal strip, antenna (A1-A2-G)	88B935
	Terminal strip, speaker (G-3.2-8-500)	88B936

NOTES

SERVICE PARTS LISTS

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C-1	Tuning gang, 7 section (Main Tuning)	48D314
C-2	Tuning gang, 12 section (Bandspread Tuning)	48D315
C-3	1000 mmfd. 5%, 500 V.; silver mica	47X20D102J
C-4	4-50 mmfd., variable air (Antenna Trimmer)	48B313
C-5,17,36,87, 128,132	.047 mfd. 20%, 200 V.; molded paper	46BR473L2
C-6	.01 mfd. 20%, 600 V.; molded paper	46BR103L6
C-7,19,40,41, 43,53,57,62, 67,76,78,83, 86,140,142,143	.047 mfd. 20%, 600 V., molded paper	46BR473L6
C-8,30,91,145, 146	.02 mfd. +80 -20%, 500 V.; ceramic disc	47A242
C-9	15 mmfd. 10%, N750, 500 V.; ceramic	47X20UK150K
C-10,13	3.3 mmfd. 10%, 500 V.; bakelite	47B403-5
C-11-12	Trimmer assembly, two section; 5-50 mmfd. each section	44C436
C-14-15-16, 26-27-28	Trimmer assembly, three section; 5-50 mmfd. each section	44C435
C-18,37,38, 39,88,121, 122,144	.01 mfd. +80-20%, 450 V.; ceramic disc	47A224
C-20	15 mmfd. 10%, N750, 500 V.; ceramic	47X20UJ150K
C-21	3.3 mmfd. ± .25 mmfd., N750, 500 V.: ceramic	47X20UJ033C
C-22,147	15 mmfd. 10%, NPO, 500 V.; ceramic	47X20CG150K
C-23-25-29	Trimmer assembly, three section; 2-18 mmfd., 2-18 mmfd., 3-30 mmfd.	44C440
C-24	20 mmfd. 10%, NPO, 500 V.; ceramic	47X20CG200K
C-31,117	100 mmfd. 10%, N750, 500 V.; ceramic	47X20UJ101K
C-32,33,35	4700 mmfd. 10%, 500 V.; mica	47X30B472K
C-34	2.2 mmfd. 10%, 500 V.; bakelite	47B403-4
C-42	100 mmfd. 10%, 450 V.; ceramic	47CA20A101K
C-44,46,54, 56,64,66,79, 81,84	390 mmfd. 5%, 500 V.; silver mica	47X20E391J
C-45,55,80	1.5 mmfd. 10%, 500 V.; bakelite	47B403-3
C-47,85,124, 125	220 mmfd. 10%, 500 V.; ceramic	47CA20A221K
C-48,49,58, 59,68,69, 74,75	.0033 mfd. 10%, 400 V.; molded paper	46BR332E4
C-50,60,70,72	.047 mfd. 10%, 200 V.; molded paper	46BR473E2
C-51,61,71,73	.01 mfd. 10%, 400 V.; molded paper	46BR103E4
C-52,63,77, 82	.22 mfd. 20%, 200 V.; molded paper	46BR224L2
C-65	.51 mmfd. 10%, 500 V.; bakelite	47B403-0
C-89	8-50 mmfd. N750, ceramic trimmer (Crystal Adj)	44B437
C-90	150 mmfd. 10%, 500 V.; mica	47X20B151K
C-92	4.7 mmfd. ± .25 mmfd., N2200 ±500 PPM; ceramic	47D20W047C
C-93,99,102, 107,111,114	2.6-13.3 mmfd., variable air	48B316
C-94	1000 mmfd. 5%, N2200 ± 500 PPM; ceramic	47B441
C-95	2200 mmfd. 5%, 500 V.; silver mica	47X30E222J
C-96,97,98	443 mmfd. 2%, N330, 500 V.; ceramic	47B407
C-100,101	3.9 mmfd. 10%, N1500 ±250 PPM; ceramic	47D20V039C
C-103,104, 106	310 mmfd. 2%, N80, 500 V.; ceramic	47X45LG311G
C-105	68 mmfd. 1%, N150, 500 V.; ceramic	47X32PG680F
C-108	5.1 mmfd. ± .5 mmfd., N750, 500 V.; ceramic	47X20UJ051D
C-109	117 mmfd. 1%, N150 ± 30 PPM, 500 V.; ceramic	47B440
C-110,115	140 mmfd. 1%, NPO, 500 V.; ceramic	47X35CG141F
C-112	10 mmfd. 10%, N470, 500 V.; ceramic	47X20TH100F
C-113	12 mmfd. 10%, N470, 500 V.; ceramic	47X20TH120K
C-116	1.0 mmfd. 10%, N1500 ± 250 PPM, 500 V.; ceramic	47D20V010B
C-118	1.0 mmfd. 10%, N750, 500 V.; ceramic	47X20UJ010B
C-119	.047 mfd. 10%, 600 V.; molded paper	46BR473E6
C-120	10 mfd. 10%, 150 V.; electrolytic	45A097
C-123A-B-C-D	30 mfd. 450 V., 10 mfd. 450 V., 10 mfd. 450 V., 20 mfd. 25 V.; electrolytic	45A041
C-126,137	.022 mfd. 20%, 200 V.; molded paper	46BR223L2
C-127	68 mmfd. 10%, NPO, 500 V.; ceramic	47X25CK680K
C-129,133	.022 mfd. 20%, 600 V.; molded paper	46BR223L6
C-130	220 mmfd. 10%, 500 V.; silver mica	47X20D221K
C-131	560 mmfd. 5%, 500 V.; silver mica	47X20E561J
C-134	1500 mmfd. 10%, 500 V.; silver mica	47X30D152K
C-135	.22 mfd. 20%, 600 V.; molded paper	46BR224L6
C-136	470 mmfd. 10%, 500 V.; mica	47X20A471K
C-138	10 mfd. 50 V., electrolytic	45B211
C-139	.033 mfd. 20%, 600 V.; molded paper	46BR333L6
C-141	680 mmfd. 10%, 500 V.; mica	47X20A681K
	RESISTORS	
R-1,2,73,100	470,000 ohms 10%, 1/2 W.	23X20X474K
R-3,11	22 ohms 10%, 1/2 W.	23X20X220K
R-4,12,102	100 ohms 10%, 1/2 W.	23X20X101K
R-5	68,000 ohms 10%, 1 W.	23X30X683K
R-6,77,80	10 ohms 10%, 1/2 W.	23X20X100K
R-7,16,28, 34,49,58, 67,93,99, 103,104	2200 ohms 10%, 1/2 W	23X20X222K
R-8	33 ohms 10%, 1/2 W.	23X20X330K
R-9	500 ohms, variable ("S" Meter Adj.)	25C022
R-10,22,23, 24,25,26,27, 75,95	100,000 ohms 10%, 1/2 W.	23X20X104K
R-13	18,000 ohms 10%, 1/2W.	23X20X183K
R-14,79	1000 ohms 10%, 1/2W.	23X20X102K

N - neg. temp. coef. NPO - zero temp. coef. PPM - parts/million/° C

SERVICE PARTS LISTS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
	RESISTORS (Cont.)	
R-15,21,33, 97,107	8200 ohms 10%, 1/2 W.	23X20X822K
R-17	2.2 megohms 10%, 1/2 W.	23X20X225K
R-18	2700 ohms 10%, 1/2 W.	23X20X272K
R-19	120,000 ohms 10%, 1/2 W.	23X20X124K
R-20,81,94	47 ohms 10%, 1/2 W.	23X20X470K
R-29,78	22,000 ohms 10%, 1/2 W.	23X20X223K
R-30	120,000 ohms 10%, 1/2 W. or 330,000 ohms 10%, 1/2 W. (see schematic)	23X20X124K 23X20X334K
R-31,68,87,92	1 megohm 10%, 1/2 W.	23X20X105K
R-32,47,56	220 ohms 10%, 1/2 W.	23X20X221K
R-35,41,50,59	56 ohms 5%, 1/2 W.	23X20X560J
R-36,42,51,60	180 ohms 5%, 1/2 W.	23X20X181J
R-37,38,43, 44,52,53,61, 62	330 ohms 5%, 1/2 W.	23X20X331J
R-39,45,54,63	820 ohms 5%, 1/2 W.	23X20X821J
R-40,46,55,64	16,000 ohms 5%, 1/2 W.	23X20X163J
R-48,57,66	39,000 ohms 10%, 1 W.	23X30X393K
R-65	180 ohms 10%, 1/2 W.	23X20X181K
R-69	27,000 ohms 10%, 1/2 W.	23X20X273K
R-70,76	180,000 ohms 10%, 1/2 W.	23X20X184K
R-71	68,000 ohms 10%, 1/2 W.	23X20X683K
R-72	4700 ohms 10%, 1/2 W.	23X20X472K
R-74	3300 ohms 10%, 1/2 W.	23X20X332K
R-82	10,000 ohms, variable (Sensitivity)	25B1058
R-83	10,000 ohms, variable (Monitor)	25B1062
R-84,90	330,000 ohms 10%, 1/2 W.	23X20X334K
R-85	4000 ohms 5%, 10W; wirewound	24BG402D
R-86	6.8 ohms 10%, 1 W.	23X30X068K
R-88	47,000 ohms 10%, 1/2 W.	23X20X473K
R-89	82,000 ohms 10%, 1/2 W.	23X20X823K
R-91	1.5 megohms 10%, 1/2 W.	23X20X155K
R-96	270 ohms 10%, 1/2 W.	23X20X271K
R-98	33,000 ohms 10%, 1 W.	23X30X333K
R-101	1 megohm, variable (Volume); includes on-off switch S7	25B606
R-105,106 109,110	220,000 ohms 10%, 1/2 W.	23X20X224K
R-108	220 ohms 10%, 2 W.	23X40X221K
R-111	10,000 ohms 10%, 1/2 W.	23X20X103K
R-112	4700 ohms 10%, 2 W.	23X40X472K
	COILS AND TRANSFORMERS	
L-1	Coil, antenna; band 6	51B1726
L-2	Coil, antenna; band 5	51B1727
L-3	Coil, antenna; band 4	51B1728
L-4	Coil, antenna; band 3	51B1729
L-5	Coil, antenna; band 2	51B1730
L-6	Coil, 1550 kc trap	51B1747
L-7	Coil, RF; band 6	51B1732
L-8	Coil, RF; band 5	51B1733
L-9	Coil, RF; band 4	51B1723
L-10	Coil, RF; band 3	51B1724
L-11	Coil, RF; band 2	51B1725
L-12	Coil, antenna; band 1	51B1731
L-13	Coil, mixer; band 6	51B1732
L-14	Coil, mixer; band 5	51B1733
L-15	Coil, mixer; band 4	51B1734
L-16	Coil, mixer; band 3	51B1735
L-17	Coil, mixer; band 2	51B1736
L-18	Coil, mixer; band 1	51B1737
L-19	Coil, oscillator; band 6	51B1717
L-20	Coil, oscillator; band 5	51B1718
L-21	Coil, oscillator; band 4	51B1719
L-22	Coil, oscillator; band 3	51B1720
L-23	Coil, oscillator; band 2	51B1721
L-24	Coil, oscillator; band 1	51B1722
L-25,26,27	Choke, RF; red	53B008
L-28	Coil, AVC amplifier	50C612
L-29	Choke, filter; 9H, 135 ma, 260 ohms DC	56C163
L-30	Choke, RF; blue	53B009
L-31	Coil, BFO (with shield)	54B050
L-32	Coil, BFO amplifier	51B1746
T-1,3	Transformer, IF; 2075 KC	50C611
T-2,4	Transformer, IF; 1550 KC	50C603
T-5	Transformer, 2nd conv. osc.	50C602
T-6,7,8,9	Transformer, IF; 50 KC (1st and 2nd interstage)	50C601
T-10	Transformer, IF; 50 KC (3rd interstage primary)	50C613
T-11	Transformer, IF; 50 KC (3rd interstage secondary)	50C614
T-12,13	Transformer, IF; 50 KC (detector)	50C615
T-14	Transformer, power; for Model SX-88	52C288
	for Model SX-88U	52D295
T-15	Transformer, audio output	55C213
	SWITCHES	
S-1A-B-C	Switch assembly, Band Selector; antenna section and 1st RF amp. grid	62C076
S-1D-E	Switch assembly, Band Selector; 1st RF amp. plate and 2nd RF amp. grid	62C077
S-1F-G	Switch assembly, Band Selector; 2nd RF amp. plate and 1st mixer grid	62C077
S-1H-I	Switch assembly, Band Selector, 1st conv. osc. grid and cathode	62C078
S-1J	Switch section, Band Selector; 1st mixer plate	62B075
S-1K	Switch assembly, Band Selector; 2nd conv. osc. cathode and 2nd RF amp. cathode	62B079
S-2	Switch assembly, BAND WIDTH	60D561
S-3	Switch assembly, RESPONSE	60C565
S-4,5	Switch, spst toggle; AVC ON-OFF and CAL OFF-ON	60A138
S-6,9	Switch, dpdt toggle; REC-STANDBY and ANL OFF-ON	60B575
S-7	Switch, power off-on (part of Volume control R101)	-------
S-8	Switch, toggle; dpdt center off (CW-AM-SSB)	60B568
	JACKS, PLUGS AND SOCKETS	
J-1,3	Jack, single pin; IF OUTPUT and PHONO	36A041
J-2	Jack, PHONES	36B004
PL-2	Plug, octal; AC jumper	35A003
SO-1	Socket, AC ACCESSORY	10B015
SO-2	Socket, octal; POWER SOCKET	6B296
SO-3	Socket, crystal	6A482
	Socket, pilot lamp; for "S" meter (with leads)	6A262
	Socket, pilot lamp; for tuning dials (with leads)	86B157
	Socket, tube; octal	6B296
	Socket, tube; 9 pin miniature (ceramic)	6B499
	Socket, tube; 9 pin miniature (mica filled)	6B500
	Socket, tube; 7 pin miniature	6B505

SERVICE PARTS LISTS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
	TUBES AND DIAL LAMPS	
V-1,10	6CB6: 1st RF Amp, AVC Amp	90X6CB6
V-2,4,6,7,8 16,20	6BA6: 2nd RF Amp, 2nd Mixer, 1st 50 KC IF Amp, 2nd 50 KC IF Amp, 3rd 50 KC IF Amp, BFO Amp, Xtal Cal.	90X6BA6
V-3	6U8: 1st Oscillator-Mixer	90X6U8
V-5	12AT7: 2nd conv. oscillator	90X12AT7
V-9	6AL5: Detector and ANL	90X6AL5
V-11	12AU7: AVC Rect. and 50 KC Cath. Fol.	90X12AU7
V-12	12AX7: Audio Amp and Phase Inv.	90X12AX7
V-13,14	6V6GT: Audio Output	90X6V6GT
V-15	6C4: BFO	90X6C4
V-17	5U4G: Rectifier	90X5U4G
V-18	0D3: Voltage Regulator	90X0D3
V-19	4H4: Current Regulator	90X4H4
LM-1,2	Lamp, pilot; type 44	39A003
LM-3	Lamp, pilot; type 47	39A004
	MISCELLANEOUS	
	Belt, drive; Band Selector	14B374
	Cabinet, complete	41X25313
	Clip, gang shield; top section	76B148
	Clip, gang shield; bottom section	76B149
	Coupling flexible (for Band Selector shaft)	
	3-5/8" overall	29B222
	3-1/8" overall	29B224
X-1	Crystal, 1500 KC	19B1890
X-2	Crystal, 2125 KC	19B1891
X-3	Crystal, 100 KC	19B1886
	Detent, Band Selector switch	62C073
	Dial, band spread tuning	83D466
	Dial, main tuning	83D470
	Dial pointer assembly	41C25327
	Escutcheon, front panel	7D466
	Foot, mtg.; rubber	16A029
F-1	Fuse, 3 amp 250V; type 3AG	39A301
	Gear drive assembly, complete	41X25311
	Glass, band spread tuning dial	22B413
	Glass, main tuning dial	22B412
NE-2	Lamp, neon glow; GE type NE2; 1/25 W., 65V AC starting	39A012
PL-1	Line cord and plug	87A3644
	Logging scale, tuning dial	83C475
	Lock, line cord	76A397
M-1	Meter, "S"; 0-5 ma	82C248
	Panel, front	68D241
	Retainer, tube; V-17	76A1032
	Shaft, extension; Antenna Trimmer	74B635
	Shaft, Band Selector 10-3/4" long	74B636
	11-1/4" long	74B702
	Snap-in tri-mount	5A006
	Terminal board, steatite; 3 post type lugs (used as tie strip for oscillator padders)	41X25346
	Terminal strip, antenna (A1-A2-G)	88B935
	Terminal strip, speaker (G-3.2-8-500)	88B936
	MISCELLANEOUS (Cont.)	
	Grommet, rubber; "S" meter	16B362
	Grommet, rubber; tuning gang rear support	16A180
	Holder, fuse	6A451
	Insignia, "h"	7B485
	Knob assembly, MAIN TUNING and BAND SPREAD TUNING	41B25314
	Calibrated plate (0-100)	83B454
	Knob, phenolic	15B693
	Spring	75B294
	Button plug	17B138
	Hub	77B717
	Knob, ANTENNA TRIMMER	15A061
	Knob, BAND SELECTOR	15C743
	Knob, BAND WIDTH	15B679
	Knob, LOCK	15B699
	Knob, PITCH	15B677
	Knob, pointer set	15B676
	Knob, RESPONSE	15B678
	Knob, SENSITIVITY and VOLUME	15A097

NOTES

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.

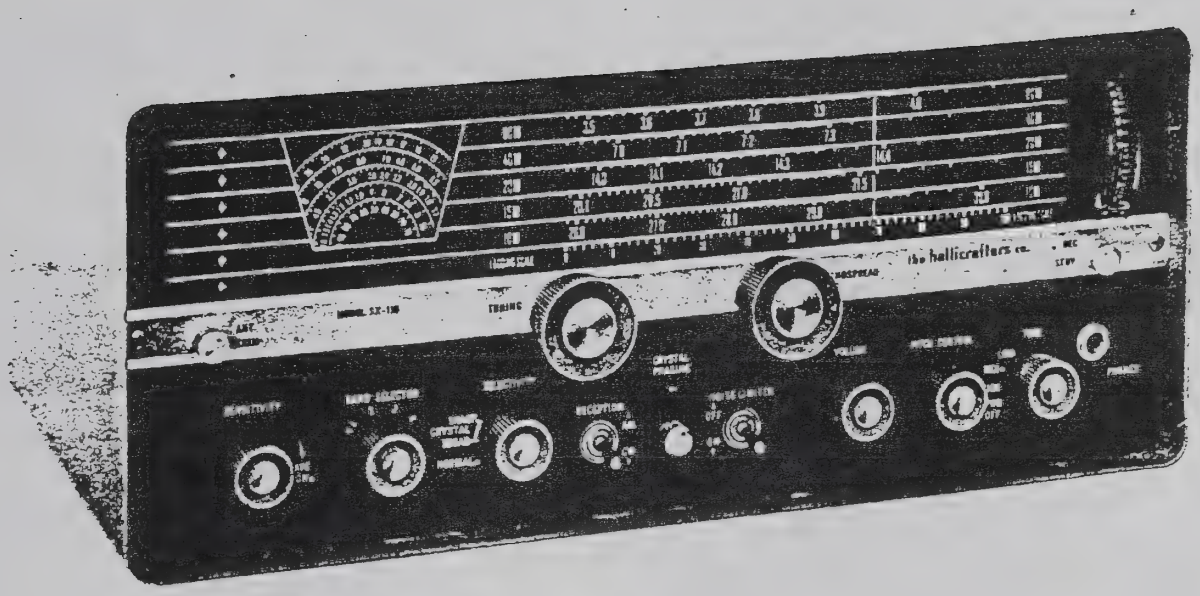
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h communications

OPERATING and SERVICE INSTRUCTIONS

SX-110

the radiomatters co.



092-104408

Figure 1. Hallicrafters Model SX-110

SECTION 1
GENERAL DESCRIPTION

1-1. INTRODUCTION

Your new Hallicrafters Model SX-110 is a precision built, highly sensitive, communications receiver providing complete coverage in the frequency range of 538 kilocycles to 34 megacycles. Eight tubes, including one rectifier, are employed in the latest superheterodyne circuit and provision is made for the reception of AM or CW signals over the entire tuning range.

For ease and flexibility of operation, two tuning dials are provided. The circular dial provides the general frequency coverage, while the slide rule type dial (the bandspread dial) is specifically calibrated for the 80, 40, 20, 15 and 10 meter bands.

For the ultimate in selectivity, a variable crystal filter system and crystal phasing control can be peak adjusted to receive those "hard to get signals". In addition, an automatic noise limiter circuit can be switched into operation. This combination provides the means of receiving many signals that would be lost in background noise with ordinary receiving equipment.

A new smartly styled "S" meter provides a professional aid for accurate tuning and a means of determining the relative strength of received signals.

Other special features include full range TONE control, SENSITIVITY control with provision for the optional use of AVC, a RECEIVE-STANDBY switch that permits silencing the receiver while maintaining it ready for instant use, without waiting for the tubes to warm up, output connections to match either an external speaker or 500 ohm line, and a headphone (PHONES) jack mounted on the front panel. To permit adjustment for optimum performance with a variety of antenna systems, a special ANTENNA TRIMMER control has been included on the front panel.

IMPORTANT

Your careful attention is especially invited to the "INSTALLATION" and "OPERATION" instructions. They have been provided to insure the satisfaction you have a right to expect from any Hallicrafters "Precision Built" product. Your receiver has an unusually high degree of sensitivity necessary to receive weak and distant stations. Careless operation of a high sensitivity receiver may result in excess noise or background hiss. These undesirable effects can be held to a minimum by careful adjustment of the SENSITIVITY, TUNING, and TONE controls as well as the proper selection and arrangement of the antenna.

SECTION II
INSTALLATION

2-1. UNPACKING

After unpacking the receiver, examine it closely for damage which may have occurred in transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for instructions before removing or destroying them.

2-2. LOCATION

The receiver is equipped with rubber mounting feet for table or shelf mounting. When locating the receiver, avoid excessively warm locations such as those near radiators and heating vents. Allow at least one inch of clearance between the back of the receiver and the wall for proper ventilation.

2-3. POWER SOURCE

The SX-110 receiver is designed to operate from a 105-125 volt, 50-60 cycle AC power source. Power consumption is 75 watts.

IMPORTANT

If in doubt about your power source, contact your local power company prior to inserting the power cord into an AC power outlet. Plugging the power cord into the wrong power source may cause extensive damage to the unit, requiring costly repairs.

2-4. ANTENNAS

The RF input of the receiver is designed for operation from either a single-wire antenna, or a half-wave doublet or other tuned antenna with transmission line impedances from 52 to 600 ohms. Antenna connections are made to a three-terminal strip at the rear of the receiver marked "A1", "A2", and "G".

A. SINGLE WIRE ANTENNA

The simplest antenna and one which will provide satisfactory results throughout the entire tuning range is a conventional single-wire antenna. In most localities, good results can be obtained with just the 15-foot length of antenna wire supplied with the receiver. Simply attach one end of this wire to terminal "A1", connect the jumper link between terminals "A2" and "G", and then run the wire about the room in any convenient manner. (See Fig. 2.). If the receiver is operated in a steel constructed building or where receiving conditions are exceptionally poor, an outside antenna should be erected as high as possible and kept free from surrounding objects. In some locations, reception may be improved by connecting a ground wire (ordinary copper wire) from terminal "G" to a cold water pipe or outside ground rod. While the use of an outside ground rod installed in accordance with Insurance Underwriter's Laboratories requirements is adequate protection against lightning, we strongly recommend an additional connection to the nearest cold water pipe to eliminate any shock hazard.

B. HALF-WAVE DOUBLET ANTENNA

For top performance, especially on the shortwave and amateur bands, the use of a half-wave doublet or other type of antenna employing a 52 to 600-ohm transmission line is recommended. A typical doublet antenna installation is shown in Fig. 3. The doublet antenna should be cut to the proper length for the most used frequency or band of frequencies. The overall length in feet of a doublet antenna is determined by the following formula:

$$\text{Length in feet} = \frac{468}{\text{Frequency in megacycles}}$$

When erecting the doublet antenna, it should be remembered that it displays directional properties broadside to its length and should be so oriented with respect to a desired station for maximum signal pick-up.

The doublet antenna may be fed with either a balanced or unbalanced transmission line. When a balanced transmission line such as "twin-lead" or a twisted pair is used, the transmission line connects to terminals "A1" and "A2", and the jumper link between terminals "A2" and "G" is disconnected. When using an unbalanced transmission line such as coaxial cable, the inner conductor connects to terminal "A1", the outer braid connects to terminal "A2", and the jumper

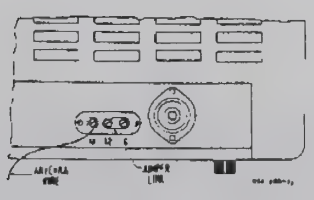


Figure 2. Single Wire Antenna

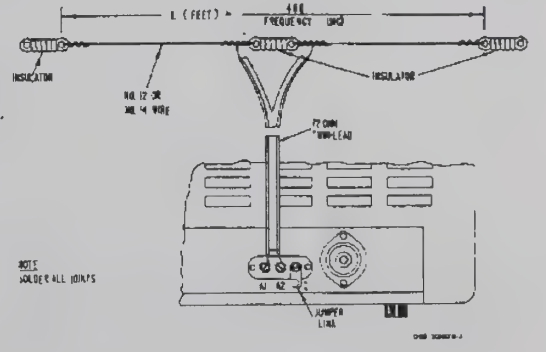


Figure 3. Doublet Antenna Using Twin-Lead Transmission Line

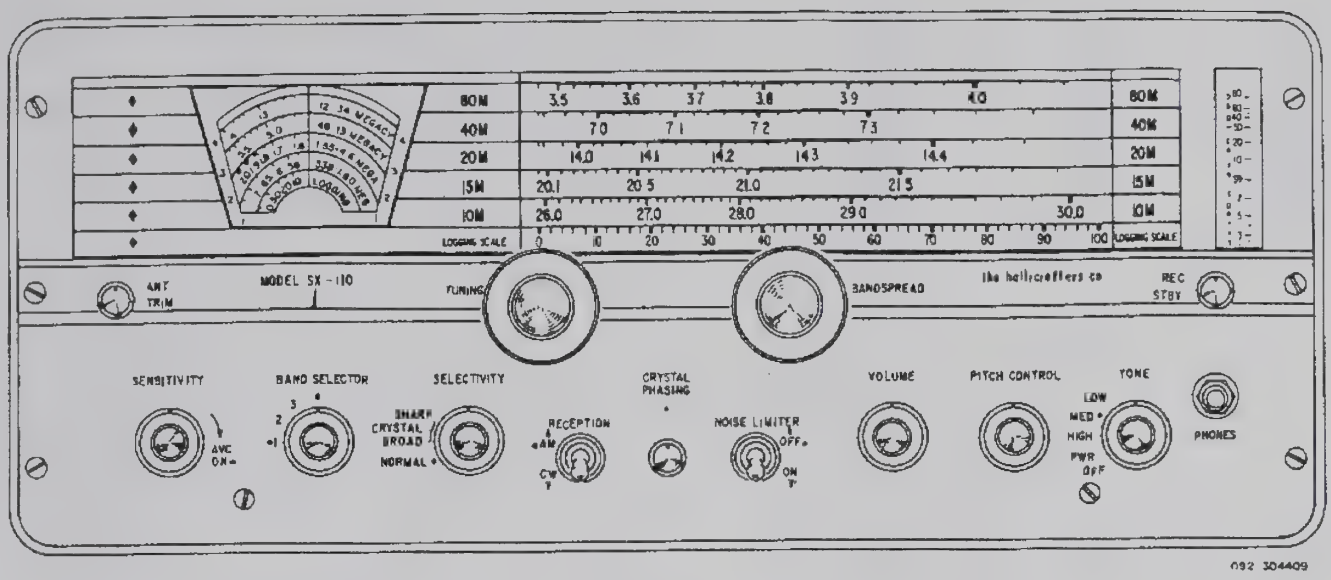


Figure 4. Operating Controls

link connects between terminals "A2" and "G". A ground wire may improve reception when using an unbalanced transmission line.

The doublet antenna provides optimum performance only at the frequency for which it is cut. Therefore, it may be desirable for reception on frequencies remote from the antenna frequency to utilize the antenna as a single wire type. This is accomplished by connecting the two transmission line leads together and connecting them to terminal "A1". The jumper link in this case should be connected between terminals "A2" and "G".

In an installation where the receiver is used in conjunction with a transmitter, it may be advantageous to use the same antenna for receiving as for transmitting. This is especially true when a directive antenna is used since the directive effects and power gain of the transmitting antenna are the same for receiving as for transmitting. Switching of the antenna from the transmitter to the receiver may be accomplished with a donble-pole, double-throw antenna changeover relay or knife switch connected in the antenna leads.

For further information regarding antennas, refer to the "Radio Amateur's Handbook" or the "A. R. R. L. Antenna Book", both published by the American Radio Relay League, West Hartford, Conn., U. S. A.

2-5. SPEAKER CONNECTION

Three screw type terminals, marked "3.2", "500", and "G", are provided on the rear apron of the chassis for connection to an external "3.2" or "500" ohm speaker. It is recommended that the Hallicrafters R-46B or R-47 speaker be employed. Either speaker may be connected to the terminals marked "3.2" and "G".

2-6. HEADPHONES

The headphone jack, marked "PHONES", is located on the front panel of the receiver and is wired so that the speaker is automatically disabled when the headphones are plugged in. The headphone output impedance is not critical and any commercial headphones may be used, including crystal types, as no direct current flows in the headphone circuit. For maximum headphone output, the use of high-impedance magnetic (5000 ohms) or crystal phones is recommended.

SECTION III
OPERATION

3-1. GENERAL

Each control of your receiver performs a definite function which contributes to its outstanding reception capabilities. Full appreciation of the receiver is to be expected only after you have become familiar with each of the controls and the effect each control has on the performance of the receiver.

As a special convenience for those not yet familiar with the full advantages of the various controls, the control settings commonly used for broadcast reception are marked with a dot.

3-2. SENSITIVITY CONTROL & AVC SWITCH

The SENSITIVITY control is used in combination with the VOLUME control to regulate the level of receiver output. The Automatic Volume Control circuit is turned "ON" when the SENSITIVITY control is set to its maximum clockwise position. The AVC switch has a definite "snap type" action and a click will be heard as the "AVC ON" position is reached.

The setiing of the SENSITIVITY control determines the ability of the receiver to pick up weak or distant stations. This control is normally set to the "AVC ON" position, when receiving AM signals, and at some other position when receiving CW signals. Maximum sensitivity may be used while tuning across the frequency range, but if the station selected has too strong a signal, excessive background hiss or distortion may be present. If this undesirable effect is produced, it can be greatly reduced by turning the SENSITIVITY control in the counterclockwise direction to a slightly lower setiing. If, after reducing the sensitivity, more volume is needed, advance the VOLUME control. When receiving CW signals, a setiing of the sensitivity control that is too high will be evidenced by "thumping" (overloading).

3-3. BAND SELECTOR CONTROL

The BAND SELECTOR control should be set for the band you wish to tune. The four positions of this control correspond to the band numbers at either side of the main tuning dial.

3-4. SELECTIVITY CONTROL

Set this control to the "NORMAL" position. If a greater degree of selectivity is required to overcome noise or separate close signals, turn this control to either of the crystal positions as required. It will then be necessary to adjust the CRYSTAL PHASING control. See "USE OF CRYSTAL PHASING CONTROL" for details (par. 3-6).

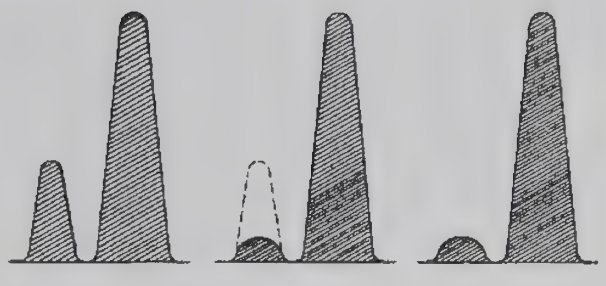
3-5. RECEPTION SWITCH

Set this switch at "AM" to listen to voice broadcasts. Set it at "CW" only, if you wish to hear code signals.

3-6. USE OF CRYSTAL PHASING CONTROL

This control permits the discrimination of interfering signals whose frequencies are very near the desired signal. To attain single signal reception, first set the SELECTIVITY control to either BROAD CRYSTAL or SHARP CRYSTAL. Choose a strong signal, perferably a commercial station, because a commercial station is likely to remain on long enough for you to complete the phasing adjustment for single signal reception.

You will find, on tuning across this signal, that it has two amplitudes. Turn the CRYSTAL PHASING control until the weaker of the two amplitudes is reduced to a minimum. Then, tune to the stronger of the two amplitudes and adjust the PITCH control (for CW reception) to a tone most pleasing to you. This adjustment for single signal selectivity will require no further adjustment, unless you change the CRYSTAL



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Figure 5. Single Signal Operation

PHASING control. See Fig. 5 for an illustration of single signal operation.

3-7. NOISE LIMITER SWITCH

This switch should normally be set at "OFF". If severe electrical disturbances, ignition noise, or other types of pulse-type noise interfere with reception, set the switch at "ON" to place the Automatic Noise Limiter circuit in operation.

3-8. VOLUME CONTROL

This control is used to regulate receiver volume. Clockwise rotation increases volume; counterclockwise rotation decreases volume.

3-9. PITCH CONTROL

This control is used to vary the pitch of code signals, and should be set for the tone most pleasing to the operator. For this control to have any effect, the RECEPTION switch must be set at "CW".

3-10. TONE CONTROL

The TONE control is a combination receiver ON-OFF switch and 3-position TONE control. In the "PWR OFF" position, the receiver is inoperative. To turn the receiver on, simply rotate the control to any of its three remaining positions. For AM reception, set the control for the desired tonal quality. For CW reception, set the control at "LOW".

3-11. ANTENNA TRIMMER CONTROL

The ANTENNA TRIMMER control permits tuning of the antenna to provide the best possible reception. Antenna tuning is desirable, as the electrical characteristics of any antenna system will vary somewhat over the wide range of frequencies that may be tuned by this receiver. When the receiver is placed in operation, this control should be set for maximum signal as indicated on the "S" meter and thereafter, may be used as the final tuning adjustment when changing stations.

3-12. TUNING AND BANDSPREAD CONTROLS

The TUNING and BANDSPREAD controls are used in conjunction with one another to tune in the desired signal. Wide tuning is performed with the TUNING control and fine tuning with the BANDSPREAD control.

A. MAIN TUNING DIAL

The main tuning or left-hand dial is operated by the TUNING control. This dial has four

calibrated scales, one for each of the four frequency bands covered by the receiver. It also contains a 20 division logging scale for accurately logging and relocating stations of special interest. The main tuning dial should be set for the desired station frequency after the BANDSPREAD control has been set fully clockwise (minimum bandspread tuning capacity).

IMPORTANT

The receiver frequency readings or calibration on the main tuning dial will be correct only if the BANDSPREAD control has been set fully clockwise. If it is set at any other setting, the additional bandspread capacity added to the main tuning capacity will throw off the main tuning dial calibration, because the receiver has been calibrated with the bandspread tuning capacitor set at minimum.

The dial settings for the 80, 40, 20, 15, and 10 meter amateur bands are indicated on the main tuning dial by white dots. When tuning the amateur bands with the bandspread dial, the main tuning dial must be set at the dot corresponding to the desired amateur band. The 160 meter amateur band is indicated on the dial by three short double-weight lines.

B. BANDSPREAD DIAL

The bandspread or right-hand dial is operated by the BANDSPREAD control. This dial contains five scales calibrated for the 80, 40, 20, 15, and 10 meter amateur bands. These five scales are calibrated to read receiver frequency directly when the main tuning dial has been set to the index dot of the desired amateur band. For convenience in tuning, the AM phone bands are indicated on the bandspread dial by double-weight lines.

In addition to ita use on the amateur bands, the bandspread dial may also be utilized as a fine tuning adjustment over any portion of the receiver tuning range. Two methods of fine tuning are described below.

(1). The first method of fine tuning is used when it is desired to tune in a single signal with precision accuracy. First the BANDSPREAD control is set a few degrees from its full clockwise position, then the desired signal is located with the TUNING control, and finally the signal is accurately tuned in by "rocking" the BANDSPREAD control (turning it slightly to the left and right) until the signal is loudest and clearest.

(2). The second method of fine tuning is used when it is desired to tune through a group of signals. With the BANDSPREAD control set fully clockwise, adjust the TUNING control to tune in the highest frequency signal in the group. The other signals can then be heard by slowly turning the BANDSPREAD control in a counterclockwise direction.

3-13. STANDBY-RECEIVER SWITCH

This switch, normally set at "REC", permits you to silence the receiver without turning it off. To silence the receiver, set the switch at "STANDBY". In this position, the RF and IF stages are cut off, but the tube heaters remain at operating temperature for instant use. To resume reception at any time, simply return the switch to the "REC" position.

3-14. USE OF THE "S" METER

The "S" meter is normally useful only when the SENSITIVITY control is set to the "AVC ON" position. Sharp accurate tuning can be easily accomplished by carefully observing the meter and tuning for maximum indication. The meter is calibrated in "S" units and DB over S-9. The calibration serves as a method of comparing the relative strength of received signals.

3-15. SERVICE OR OPERATION QUESTIONS

For any further information regarding operation or servicing of your receiver, contact your Hallicrafters dealer. The Hallicrafters Co. maintains an extensive system of authorized service centers where any required service will be performed promptly and efficiently at a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown below. For the location of the one nearest you, consult your dealer or telephone directory.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.



SECTION IV
SERVICE DATA

4-1. TECHNICAL SPECIFICATIONS

TUBES ..... Eight including rectifier
HEADPHONE OUTPUT ..... High impedance (See Par. 2-6)
ANTENNA INPUT..... For single wire or 52-600 ohm balanced or unbalanced line.
POWER SOURCE ..... 105-125 volts, 50-60 cycles AC
POWER CONSUMPTION ..... 75 watts
RECEPTION ..... AM and CW
INTERMEDIATE FREQUENCY ..... 455 KC
AUDIO OUTPUT IMPEDANCE .... Matches 3.2 ohms or 500 ohms
DIMENSIONS.. 18 3/4" wide x 10 1/4" deep x 8" high
WEIGHT, Net ..... 28 lbs., 4 oz.
WEIGHT, Shipping ..... 32 lbs.

FREQUENCY COVERAGE

Band	Frequency Range	Calibrated Band Spread
1	.538 - 1.6 MC	-
2	1.55 - 4.6 MC	80M
3	4.6 - 13.0 MC	40M
4	12.0 - 34.0 MC	20, 15, and 10M

4-2. TUBE AND DIAL LAMP REPLACEMENT

To gain access to the tubes and dial lamps, see "CHASSIS REMOVAL". The tube locations, as well as their functions, are shown in Fig. 7.

4-3. CHASSIS REMOVAL

The chassis and front panel assembly are removable from the cabinet as a unit by removing the three screws at each side of the front panel and the five screws on the underside of the cabinet. When removing the chassis from the cabinet, care should be taken not to damage or disturb any of the variable adjustments.

4-4. "S" METER ADJUSTMENTS

A. MECHANICAL ADJUSTMENT

Turn the receiver "OFF". See "CHASSIS REMOVAL" and slide the chassis part way out of the cabinet. Locate the adjustment screw on the side of the "S" meter. Carefully rotate this adjustment until the pointer is in line with the top index mark on the meter scale.

B. ELECTRICAL ADJUSTMENT

Short the antenna terminals to the chassis. Set the RECEIVE/STANDBY at "RECEIVE", RECEPTION switch at "AM", SENSITIVITY switch fully clockwise (AVC ON) position, and the NOISE LIMITER switch at "OFF". Turn the receiver on and turn the "S" meter adjustment, that is located on the rear apron of the chassis (see Fig. 7), until the pointer indicates zero.

4-5. DIAL CORD RESTRINGING

To restring the TUNING or BANDSPREAD dials, first remove the chassis from the cabinet. See "CHASSIS REMOVAL". Remove the front panel from the cabinet by removing the control knobs, the two toggle switch and PHONES jack decorative nuts, the two screws at the bottom of the front panel. Then remove the main tuning dial to gain access to the drive pulleys. For stringing details, refer to Fig. 6. Note that stringing is done with the TUNING and BANDSPREAD gangs fully meshed. After stringing is completed, cut off the excess dial cord and apply a drop of quick drying cement to the knots.

With the TUNING and BANDSPREAD gangs fully meshed, replace the dial so that the index marks at the low frequency end of the dial are in line with the hairline on the dial window.

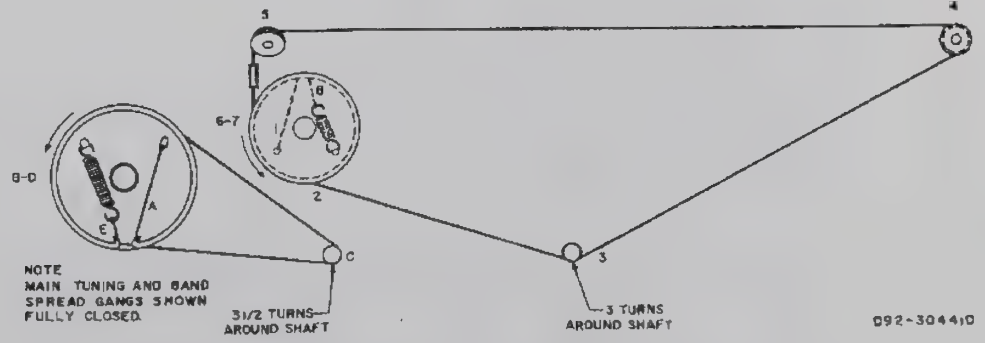


Figure 6. Dial Cord Stringing Diagram

SECTION V
ALIGNMENT

5-1. GENERAL

This receiver has been carefully aligned at the factory by specially trained personnel using precision equipment. Alignment of the receiver should not be attempted until all other possible causes of faulty operation have been investigated. Alignment should not be required unless the receiver has been tampered with or component parts have been replaced in the RF or IF stages. Alignment should only be made by persons familiar with communications receivers and experienced in their alignment. Refer to Figs. 7 and 8 for location of all alignment adjustments.

5-2. EQUIPMENT REQUIRED

1. Signal generator covering 455 KC to 28 MC.
2. Output meter (or AC scale of VTVM). Connect meter from 500 ohm speaker terminal to ground.
3. Non-metallic alignment tool.
4. Standard RTMA dummy antenna shown in Fig. 9.
5. .02 mfd. capacitor.

5-3. INITIAL CONTROL SETTINGS

SENSITIVITY	Maximum but with AVC off
VOLUME	Maximum
NOISE LIMITER	OFF
STANDBY-RECEIVE	RECEIVE
TONE	HIGH

Other controls to be set as indicated by the alignment chart.

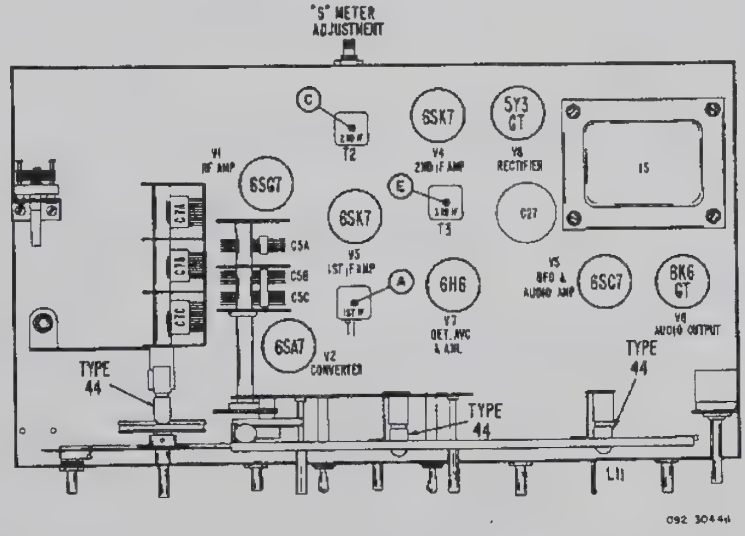


Figure 7. Top View Chassis Tube Locations And Alignment Points

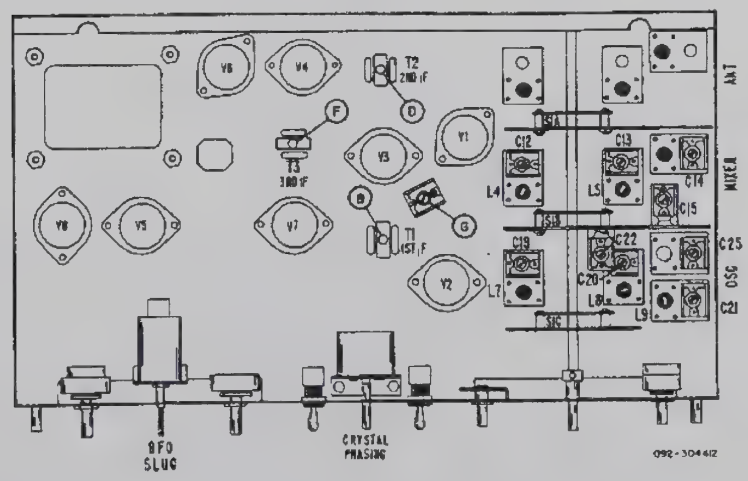


Figure 8. Bottom View Chassis Tube Locations And Alignment Points

5-4. ALIGNMENT PROCEDURE

- The local oscillator frequency is higher than the signal frequency on bands 1, 2, and 3, and lower than the signal frequency on band 4.
- RF alignment can be made with chassis in cabinet. Holes in bottom of cabinet provide access in all RF adjustments.
- For IF alignment, remove chassis from cabinet.
- Use just enough generator output to maintain a 500 milliwatt reading on the output meter.

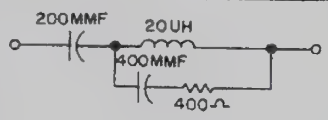


Figure 9. RETMA Dummy Antenna

IF ALIGNMENT

Step	Signal Generator Coupling	Signal Gen. Frequency	Receiver Control Settings	Receiver Dial Settings	Adjust	Remarks
*1	Connect gen. to stator of gang (center section) through a .02 mfd. capacitor.	455 KC No Modulation	BAND SELECTOR at 2. SELECTIVITY switch at BROAD CRYSTAL. RECEPTION switch at CW.	TUNING: 50 on logging scale BANDSPREAD: 30 on outer scale	BFO Slug	**Remove PITCH control knob and set shaft for a zero beat. Do not replace knob.
*2	Same as Step 1	455 KC (approx.) No Modulation	Adjust PITCH for a 400-1000 cycle note. Other controls same as Step 1.	Same as Step 1	A	While turning the slug very slowly in one direction, slowly "rock" the signal generator. As the adjustment passes through the response of the crystal filter, the output goes through a maximum, dips down, and starts going up again. The correct setting of this slug is in the center of the observed dip. A swishing note, in contrast to the sharp crystal tone will be apparent when the correct adjustment has been reached.
3	Same as Step 1	Crystal Frequency	SELECTIVITY switch at SHARP CRYSTAL. Other controls same as Step 1.	Same as Step 1	Signal Generator	Adjust the generator frequency for maximum output. This will be the exact frequency of the crystal. A slight reduction in output will be noted when switching from BROAD to SHARP CRYSTAL.
4	Same as Step 1	Same as Step 3	Same as Step 1	Same as Step 1	BFO Slug	Rotate shaft of PITCH control until a zero beat is obtained. Replace knob with zero in line with the panel index mark.
5	Same as Step 1	Same as Step 3 (Modulated)	SELECTIVITY switch at NORMAL, RECEPTION switch at AM. Other controls same as Step 1.	Same as Step 1	B C D E F G	Maximum output Maximum output Maximum output Maximum output Maximum output Maximum output Repeat above steps for maximum gain.

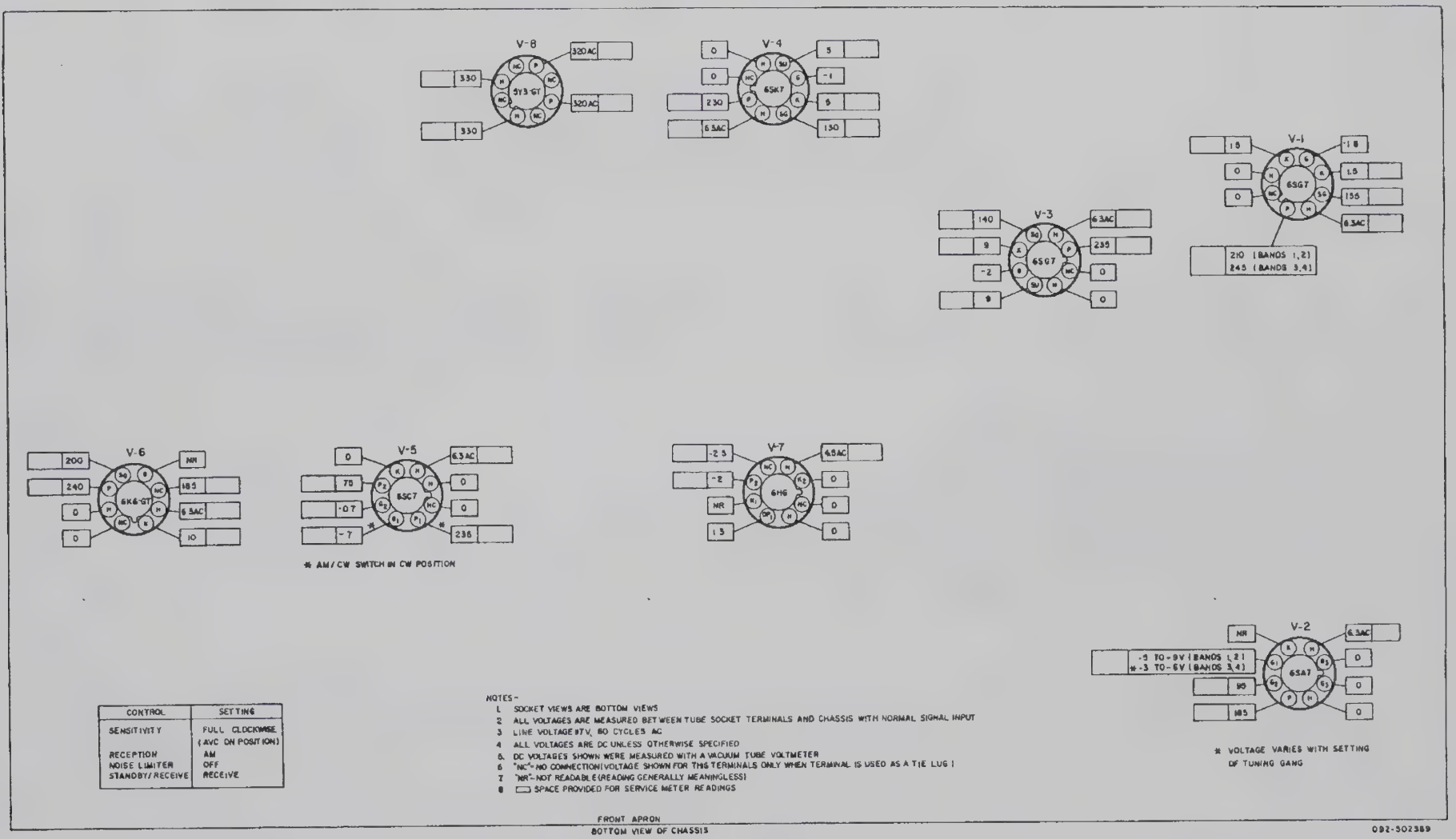
*NOTE: The crystal filter IF transformer secondary winding (adjustment A) is carefully adjusted at the factory to the frequency of the crystal. A signal generator which may be accurately set to within .25 KC of any frequency between 450 to 460 KC is required to make this adjustment. Since the average service signal generator will not meet this requirement, DO NOT attempt to make this adjustment unless a suitable signal generator is available. Start the IF alignment with Step 3 when a standard type of signal generator is used.

**NOTE: After removing the PITCH control knob (with the knob set at zero) loosen set screw attaching the sleeve shaft to the BFO iron core adjustment screw. The position of the flat on the sleeve shaft must be maintained while adjusting for a zero beat.

RF MIXER, & OSCILLATOR ALIGNMENT

The following adjustments are made with VOLUME, TONE, and SENSITIVITY controls fully clockwise, but with AVC off, NOISE LIMITER switch at OFF, SELECTIVITY switch at NORMAL, and RECEPTION switch at AM. Refer to Fig. 8 for location of all adjustments.

Step	Signal Generator Coupling	Receiver Dial Settings	Band Selector Setting Band	Adjust	Remarks
6	High side thru RTMA dummy antenna (Fig. 9) to antenna terminal "A1"; low side to "A2". Jumper between "A2" and "G".	TUNING: 28.0 MC BANDSPREAD: at extreme right position	4	C19 (osc. trimmer) C12 (mixer trimmer)	Adjust for maximum output
		TUNING: 14.0 MC BANDSPREAD: at extreme right position	4	L7 (osc. slug) L4 (mixer slug)	Same as Step 6
7	Same as Step 6	TUNING: 11.0 MC BANDSPREAD: at extreme right position	3	C20 (osc. trimmer) C13 (mixer trimmer)	Same as Step 6
		TUNING: 5.1 MC BANDSPREAD: at extreme right position	3	L8 (osc. slug) L5 (mixer slug)	Same as Step 6
8	Same as Step 6	TUNING: 4.0 MC BANDSPREAD: at extreme right position	2	C21 (osc. trimmer) C14 (mixer trimmer)	Same as Step 6
		TUNING: 1.8 MC BANDSPREAD: at extreme right position	2	L9 (osc. slug)	Same as Step 6
9	Same as Step 6	TUNING: 1.4 MC BANDSPREAD: at extreme right position	1	C22 (osc. trimmer) C15 (mixer trimmer)	Same as Step 6
		TUNING: .6 MC BANDSPREAD: at extreme right position	1	C25 (osc. padder)	Same as Step 6



CONTROL	SETTING
SENSITIVITY	FULL CLOCKWISE (AVC ON POSITION)
RECEPTION	AM
NOISE LIMITER	OFF
STANDBY/RECEIVE	RECEIVE

NOTES -
1. SOCKET VIEWS ARE BOTTOM VIEWS
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH NORMAL SIGNAL INPUT
3. LINE VOLTAGE 117V, 60 CYCLES AC
4. ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED
5. DC VOLTAGES SHOWN WERE MEASURED WITH A VACUUM TUBE VOLTMETER
6. "NC" = NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINALS ONLY WHEN TERMINAL IS USED AS A TIE LUG)
7. "NR" = NOT READABLE (READING GENERALLY MEANINGLESS)
8. ▭ SPACE PROVIDED FOR SERVICE METER READINGS

FRONT APRON
BOTTOM VIEW OF CHASSIS

092-502389

Figure 10. Voltage Chart

SERVICE PARTS LIST

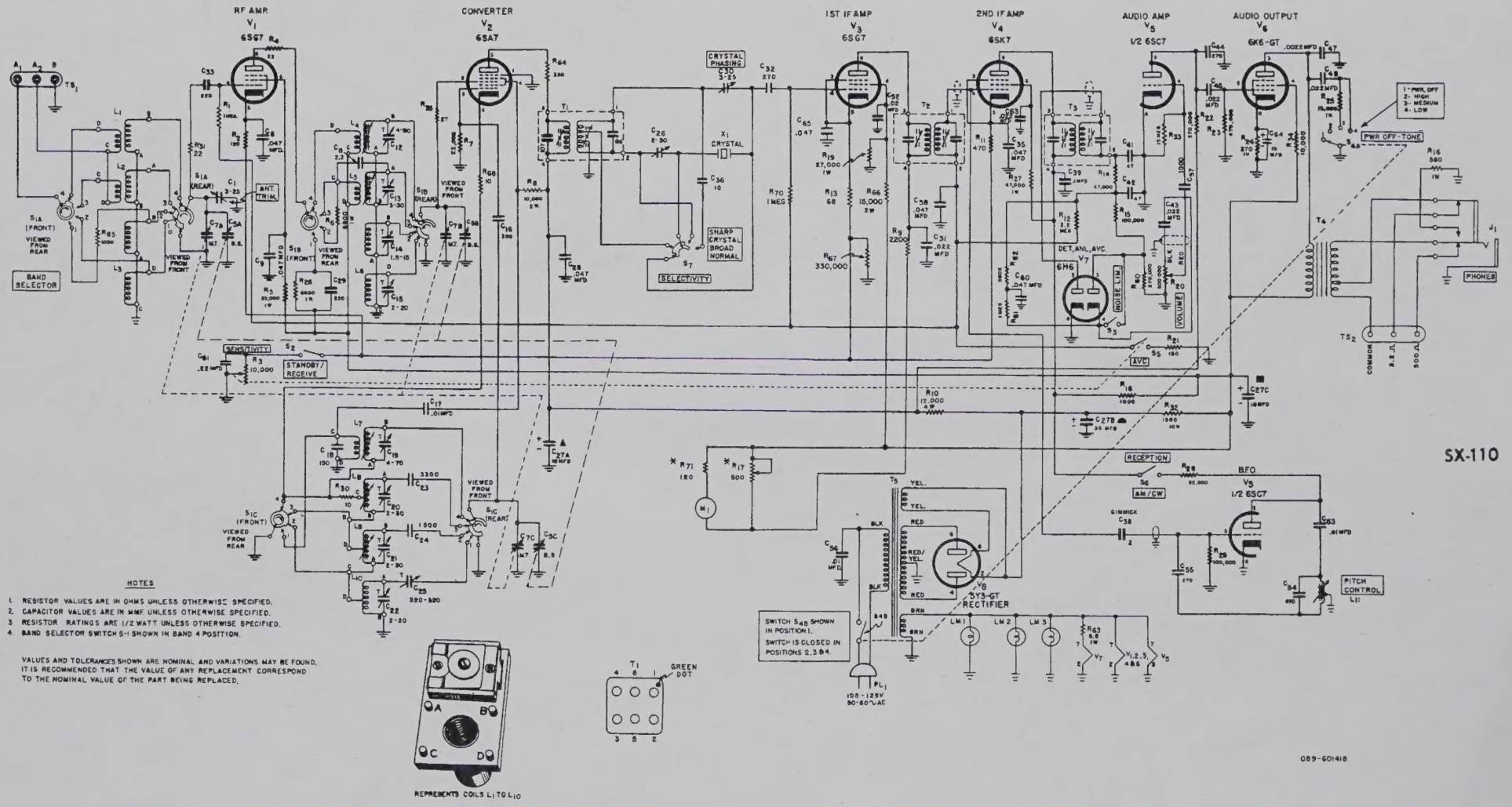
Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C1	3-25 mmf.; Air Trimmer; Antenna Trimmer Control	048-200451
C5	Variable Capacitor, 3 section; Bandspread Tuning (pulley included)	048-300449
C7	Variable Capacitor, 3 section; Main Tuning (pulley included)	048-100448
C8, 35, 58, 60, 65	.047 mfd., 20%, 200V.; Molded Paper	499-014473
C9, 28	.047 mfd., 20%, 600V.; Molded Paper	499-034473
C11	2.2 mmf.; Neutralizing	047-100160-04
C12	4-80 mmf.; Mica Trimmer	044-100395
C13	3-30 mmf.; Mica Trimmer	044-100396
C14	1.5-15 mmf.; Mica Trimmer	044-200147
C15, 22	2-20 mmf.; Mica Trimmer	044-100191
C16	390 mmf.; 10%, 500V.; Mica	470-213391
C17, 53, 56	.01 mfd., 600V.; Molded Paper	499-034103
C18	150 mmf., 5%, 500V.; Mica	470-222151
C19	4-70 mmf.; Mica Trimmer	044-100149
C20, 21	2-30 mmf.; Mica Trimmer	044-100148
C23	3300 mmf., 5%, 500V.; Mica	470-422332
C24	1500 mmf., 2%, 500V.; Mica	470-421152
C25	320-530 mmf.; Mica Padder	044-100394
C26	2-30 mmf.; Crystal IF Trimmer	044-100047
C27	30-10-10 mfd., 450V.; Electrolytic	045-100062
C29, 33	220 mmf., 10%, 500V.; Mica	470-213221
C30	3-25 mmf.; Crystal Phasing Trimmer	048-200452
C31, 43, 45, 48, 63	.022 mfd., 20%, 600V.; Molded Paper	499-034223
C32, 44, 55	270 mmf., 10%, 500V.; Mica	470-213271
C36	10 mmf., 10%, N750; Ceramic	491-006100-95
C38	2 mmf.; Wire Gimmick	----------
C39	.1 mfd., 20%, 600V.; Molded Paper	499-034104
C41, 42	47 mmf., 20%, 500V.; Mica	470-214470
C47	.0022 mfd., 20%, 1000V.; Molded Paper	499-044222
C52	.02 mfd., +80-20%, 500V.; Ceramic Disc	047-100242
C54	470 mmf., 5%, 500V.; Mica	470-212471
C57	.001 mfd., 10%, 500V.; Mica	470-213102
C61	.22 mfd., 20%, 200V.; Molded Paper	499-014224
C64	10 mfd., 25V.; Electrolytic	045-100121
	***RESISTORS**	
R1, 61, 70	1 megohm, 20%	451-253105
R2, 71	120 ohm	451-252121
R3	10K ohm, variable; SENSITIVITY Control	025-201747
R4, 31	22 ohm, 20%	451-253220
R5	39K ohm, 1 Watt	451-353393
R6, 26	6.8K ohm, 1 Watt	451-352682
R7	22K ohm	451-252223
R8	10K ohm, 2Watt	451-652103
R9	2.2K ohm	451-252222
R10	12K ohm, 4 Watt, W.W.	024-101062
R11	470 ohm	451-252471
R12	2.2 megohm, 20%	451-253225
R13	68 ohm	451-252680
R14	47K ohm, 20%	451-253473
R15, 29	100K ohm, 20%	451-253104
R18	560 ohm, 1 Watt	451-352561
R17	500 ohm, variable; "S" meter adjustment	025-300022
R18, 65	1K ohm	451-252102
R19	27K ohm, 1 Watt	451-352273
R20	500K ohm, variable; VOLUME Control	025-201731
R21	150 ohm, 20%	451-253151
R22, 60	270K ohm	451-252274
R23	470K ohm, 20%	451-253474
R24	270 ohm, 1 Watt	451-352271
R25	15K ohm, 20%, 1 Watt	451-353153
R27	47K ohm, 1 Watt	451-352473
R28	22K ohm, 20%	451-253223
R30, 68	10 ohm, 20%	451-253100
R32	1.5K ohm, 10 Watt, W.W.	453-062152
R33	15 megohm, 20%	451-253156
R34	10K ohm, 20%	451-253103
R35	27 ohm	451-252270
R62	560K ohm	451-252564
R63	6.8 ohm, 1 Watt	451-352068
R64	330 ohm	451-252331
R66	15K ohm, 2 Watt	451-652153
R67	330K ohm	451-252334

*All resistors are 10%, 1/2 watt, carbon type unless otherwise specified.

	****COILS AND TRANSFORMERS**	
L1	Coil, Antenna (Band 4)	051-201939
L2	Coil, Antenna (Band 3)	051-201938
L3	Coil, Antenna (Bands 1 and 2)	051-201937
L4	Coil, Mixer (Band 4); Inc. C12	051-201905
L5	Coil, Mixer (Band 3); Inc. C13	051-201906
L6	Coil, Mixer (Bands 1 and 2); Inc. C14	051-201904
L7	Coil, Oscillator (Band 4); Inc. C19	051-201900
L8	Coil, Oscillator (Band 3); Inc. C20	051-201899
L9	Coil, Oscillator (Band 2); Inc. C21	051-201898
L10	Coil, Oscillator (Band 1); Inc. C25	051-201897
L11	Coil, BFO	054-200051
T1	Transformer, 1st Crystal	050-300656
T2	Transformer, 2nd IF	050-300657
T3	Transformer, IF; detector stage	050-300242
T4	Transformer, Audio Output	055-300265
T5	Transformer, Power	052-100209

**Coils L4 thru L10 are supplied complete with trimmer capacitor. Trimmers are also available separately. See "Capacitors".

	SWITCHES	
S1A	Wafer Switch, Antenna	060-200389
S1B	Wafer Switch, Mixer	062-200039
S1C	Wafer Switch, Oscillator	062-200044
S2	Switch, Rotary; STANDBY-RECEIVE	060-202086
S3	Switch, SPST Toggle, NOISE LIMITER	060-100689
S4	Switch, Rotary; PWR OFF-TONE	060-202116
S5	Switch, AVC, Part of R3	----------
S6	Switch, SPST Toggle; BFO	060-100138
S7	Switch, SELECTIVITY	060-202084
	Shaft, Bandswitch And Index Plate	060-200392
	JACKS, PLUGS, AND SOCKETS	
SO1	Jack, PHONE	036-200048
PL1	Line Cord and Plug Assy	087-100078
	Socket, Dial Lamp Assy.	086-200049
	Socket, Tube; Octal	006-100250
	Socket, Octal	006-200315
	TUBES AND DIAL LAMPS	
V1	6SG7, RF Amplifier	090-901181
V2	6SA7; Converter	090-901180
V3	6SG7; 1st IF Amplifier	090-901181
V4	6SK7; 2nd IF Amplifier	090-901233
V5	6SC7; BFO and Audio Amplifier	090-900874
V6	6K6GT; Audio Output	090-900856
V7	6H6; Detector, ANL and AVC	090-900847
V8	5Y3GT; Rectifier	090-901111
LM1, 2, 3	Lamp, Dial; Type #44	039-100003
	KNOBS	
	Knob, VOLUME and PITCH CONTROL	015-301258
	Knob, ANT. TRIM. XTAL PHASE, and STANDBY-RECEIVE	015-200835
	Knob, SENSITIVITY, BAND SELECTOR, SELECTIVITY, and PWR-OFF/TONE	015-201390
	Knob, MAIN TUNING and BANDSPREAD	015-301339
	MISCELLANEOUS PARTS	
	Cabinet Weld Assy.	066-402480
	Clip, Window Retainer	075-100663
	Connector, Plastic Coupling	029-200564
X1	Crystal (455 KC)	019-100123
	Dial Cord	038-100026
	Dial, MAIN TUNING	083-400 03
	Dial Plate Weld Assy.	063-304152
	Dial Window, BANDSPREAD	083-400715
	Foot, Rubber	016-100007
	Front Panel Weld Assy.	068-500898
PL1	Line Cord	087-100078
	Line Cord Lock, Male	076-100397-01
	Line Cord Lock, Female	076-100397-02
	Pointer, BANDSPREAD	082-200426
M1	"S" Meter (W/Bracket)	082-300437
	Shaft, Drive (BAND-SPREAD)	074-202155
	Shaft, Drive (MAIN TUNING)	074-202160
	Shaft, Extension	074-202190
	Spring	075-100012
	Spring, Contact Shoe Tension	075-100013
TS1	Terminal Board, Antenna	088-100032
TS2	Terminal Board, Speaker	088-100578
	Trim Strip	007-400748



SX-110

NOTES

1. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR RATINGS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
4. BAND SELECTOR SWITCH S-1 SHOWN IN BAND 4 POSITION.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

089-601418